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The Drought

EXTREMES of weather, such as drought and prolonged frost, occur very seldom in this country, but whenever they do the opportunity is taken by many people to put forward suggestions, some of them drastic and costly, for the prevention of the recurrence of the effect, as though the conditions were likely to be permanent.

The recent prolonged spell of dry weather has caused much inconvenience in some parts, and has produced its nostrums. Of these the most imposing is that relating to the construction of a "water grid" by analogy with the national electrical scheme, which has given the term "grid" popular significance. But it is just because there is an electrical grid that anything in the nature of a water grid is quite unnecessary. As Mr. A. Hugh Seabrook points out in our Correspondence columns this week, electricity provides the solution of our water problems. Each village should have its own automatically controlled electric pumping installation (often deriving its energy from a pole-mounted transformer) supplying water by a local pipework system; such installations entail but little outlay of capital, hardly any maintenance, and no attendance for operation. The same remarks apply to rural sewerage schemes, which are almost as necessary as a reliable supply of pure drinking water.

Continental engineers have informed us that rural dwellers abroad very often regard the provision of abundant quantities of water as the first of the benefits that electricity brings to them, placing it even before lighting. We have ourselves within the past few days seen a tank cart being filled from a stand-pipe by the roadside for supplying water to a whole Sussex village not far from a large town. The cart has to make many journeys a day to meet the needs of the inhabitants, one of whom told us that there would soon be an end to that kind of thing now that the last tower of the grid had been erected. Another way in which electricity can help is in making possibly contaminated water potable by the sterilisation of bacteria which has proved so successful in France.

The electric pumping load to be obtained is by no means confined to small village schemes. Many of the existing steam-pumping stations could economically be converted. Extensions to meet growth of population should as a matter of course be supplied from the mains of the local supply undertaking, provided that prejudice and obsolete ideas are not substituted for economics and technical progress when considering alternative methods, as in the notorious case of the Eggsborough waterworks, when Pontefract Corporation decided to install an isolated steam plant apparently irrespective of operating cost.

The pumping load, with its long working hours, and in some instances off-peak character, is a valuable one, but it cannot be regarded by itself. It would provide a nucleus load for networks in sparsely populated districts that would have a markedly beneficial effect on the cost per kWh supplied to all consumers.

Better Times

INDUSTRIAL reports that have recently reached us from different parts of the country agree in the main with the statements made at the opening of the Shipping and Engineering Exhibition. Improvement in the volume of work in hand in the Clyde and Tyne shipyards is accepted as an indication that things there have definitely begun to mend, and various branches of engineering trade also anticipate better times in consequence. Other reports to hand from the Midlands indicate activity in industrial electrification work, which is bringing new business both to electric motor manufacturers and to supply undertakings. A financial contemporary published the other day a review of the new industries that are being started, and the development of old ones along new lines, in Lancashire. In various cases these changes are the outcome of the difficult times through which

this part of the country is passing. A typical case of change recorded is the dismantling of a disused cotton mill in Bolton and its equipment with electrically driven machinery for the production of rayon yarn. A new industry at Stockport involves the installation, now proceeding, of plant for the manufacture of silica stone bricks. Old mills are being put to new uses, and improved methods of manufacture are being introduced in existing industries, all creating employment, and most of them causing a demand for electricity. An example of recent industrial developments which have brought benefit to the electrical industry is to be found in the decision of the Sheffield Corporation to expend £75,000 upon the provision of a bulk supply to the great steel manufacturing concern, Thomas Firth & John Brown, Limited, of Atlas and Norfolk Works.

The Work of the Engineer

THE Earl of Athlone spoke with optimism at Olympia, and Lord Stonehaven testified to the high standard of technical skill and ingenuity and to the courage and perseverance of those engaged in shipping, engineering and machinery industries. The fact that these industries have had so long a period of depression renders the signs of awakening particularly gratifying. Mr. D. A. Bremner referred to the presence of overseas visitors at the exhibition, and hoped that British buyers overseas would place orders with us, hastening the return of world prosperity. Engineering knowledge and capacity have a special bearing on the present position of affairs, which, as remarked by Lord Stonehaven and believed by many others, suggests that we have reached the end of one period of world development and are on the threshold of another. Whatever this may really mean, it still is, and will remain, the duty of engineers to harness the natural resources of the world for the service of man, and much of that work has been held in abeyance for some years, awaiting the arrival of better times. Mr. W. A. Tookey ridiculed the idea that we have lost the lead in machinery. Britain has brains and men, and all her industry needs is freedom to make good use of them.

British Grid Experience

BRITISH electrical manufacturers, whose reputation stands so greatly enhanced by reason of their production and construction work on Britain's grid during the last few years, will doubtless take full advantage of an opportunity that is arising in Spain. It has often been stated that the many millions of pounds' worth of work carried out has not earned commensurate profit, but is expected to bring its reward in orders following upon the establishment of world-wide prestige for British electrical engineering and cable manufacturing. Here, then, is an opportunity to take steps to help in that direction by ensuring that our record is brought very definitely under the notice of the Spanish Ministry of Agriculture, Industry and Commerce, which, as stated last week, is having details of all electric power plants in the country collected by the Industrial Statistics Section of the Spanish Department of Industry. In the past German electrical activity gained a great hold on such systems, but our special experience in Britain should be of great assistance to us as the new project is elaborated.

Another Advance

THE Commissioners' monthly returns show that 928 million kWh was generated by authorised undertakings in August, representing an increase of 13.7 per cent. over the corresponding period of last year with the same number of working days. As the July output was 13.1 per cent. over that for the previous July, the progress has been notably sustained. The result is that the kWh generated to the end of August (8,329 million kWh) is 7.9 per cent. in excess of the figures for the first eight months of last year, which showed an increase of 7.3 per cent. over 1931. Up to the end of June the rate of increase was appreciably less than it was last year, being 6.4 per cent. instead of 8 per cent. What has caused the spurt of the last two months—whether it be due to a general improvement throughout the country, a revival of trade in definite areas, or how far it has been helped by the changing over of private plants to public supply—is not stated in the returns, though such information would be of great value to the electrical industry as a whole.

The New Council

THURSDAY next, September 21st, is an important day for the electrical industry, for it is the date fixed under the reconstitution of the British Electrical Development Association for the new Council of sixteen to take office. There has been a great deal to do behind the scenes of course, but we ought soon to be "getting a move on."

An Institute's Jubilee

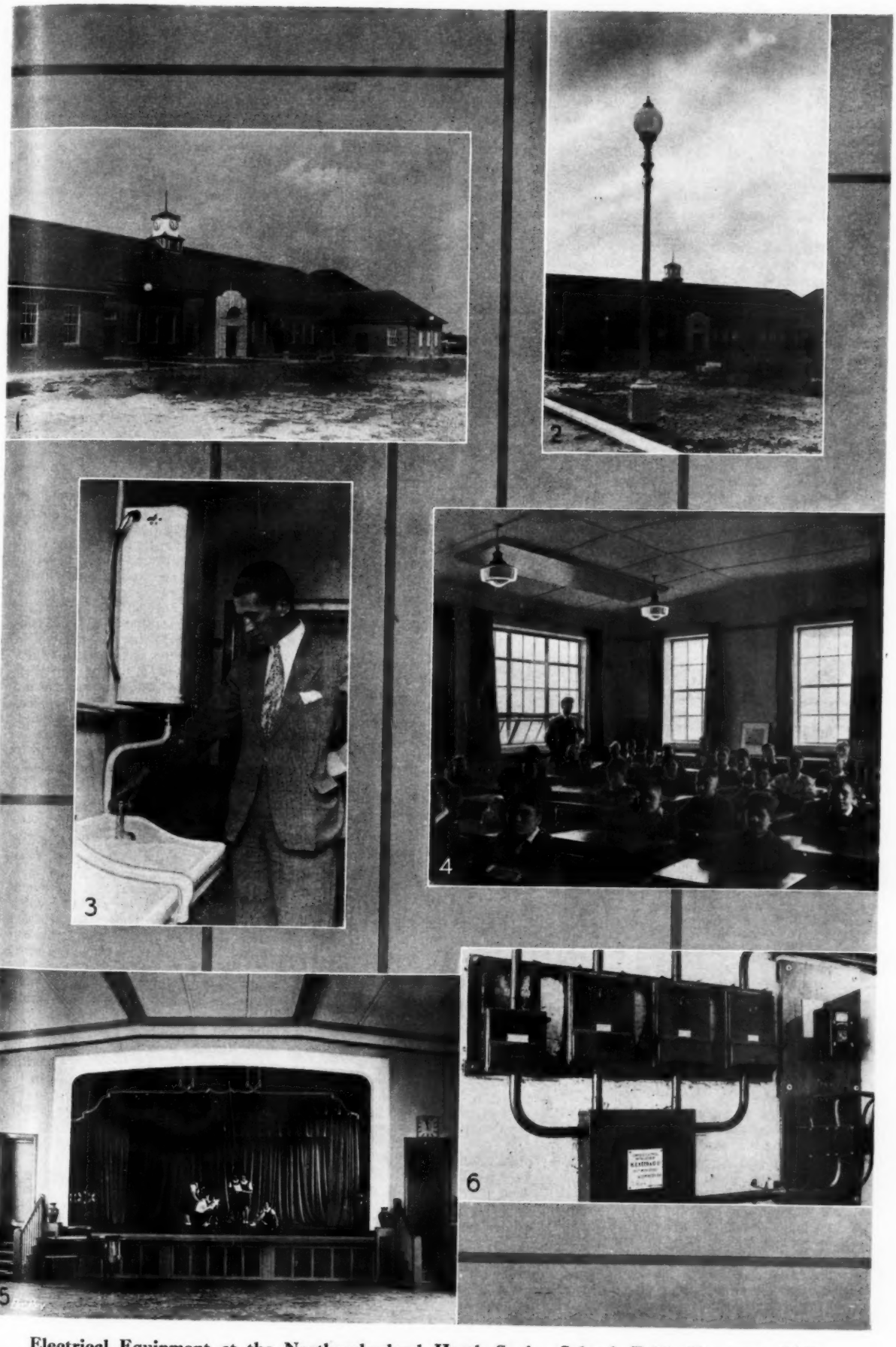
THE gathering of the Institute of Metals at Birmingham from September 18th to 21st will be the Silver Jubilee Autumn meeting of that organisation. The conviction of its founders twenty-five years ago that there was room for a second institute to provide a periodical platform for those specialising in the technics of metals has been more than justified by the excellent record of useful work accomplished. It is appropriate for the anniversary celebrations to take place at Birmingham, for it was in that city that the Institute was formed. Mr. Shaw Scott has been its secretary from the beginning and he has seen the membership grow from 200 to 2,200. Congratulations!

No Danger to Patients

THE death of a nurse at Wimbledon Hospital as the result of a 50-kV shock received (the current is said to have been 30 mA) while helping to take an X-ray photograph should not cause fear that patients are liable to injury while undergoing treatment involving the use of modern electro-medical apparatus properly installed. The deceased would have been classified as "a competent person" had she been working in a factory under the Home Office Regulations, but, as Department reports show, even the most competent are subject to absent-mindedness which may have fatal results. Though X-ray work is not specifically covered by the memorandum on "Precautions against Shock from Electro-medical Apparatus," issued last year by the Ministry of Health, the apparatus concerned was supplied and installed by a high-class firm within the past four years. We may feel reasonably confident that there would have been no chance of patients being subjected to any risk of shock.

Glare

GLARE has been roughly defined as "light in the wrong place." It was always anathema to the illumination specialist, who sometimes went far ahead of general opinion in his efforts to achieve diffused lighting. We remember the criticism passed by one engineer on the lighting of the I.E.E. lecture theatre before the war, that it gave nothing for the "eyes to bite at," but in recent years a better understanding of the function of shadow has evolved. To the layman glare meant brightness and better value for money; even to-day he often buys plain instead of pearl lamps for his home for this reason. Yet improvement in public taste has certainly been developing, and the instance given by Mr. E. J. Stewart at the Public Lighting Engineers' Conference of the preference in Glasgow for the partial concealment of the light sources in street lamps is only typical of a tendency that is becoming general. Probably the realities of high-speed traffic conditions have been the chief educational factors.



Electrical Equipment at the Northumberland Heath Senior School, Erith (See page 342)

1. Front of school showing master clock. 2. An external lamp. 3. Electric water heater in a staff cloakroom. 4. A classroom showing ceiling lamps. 5. View of stage which has electric lighting controlled by a dimmer and switchboard. 6. Main switches, &c.

Electricity and Education.

By Frederic Evans, M.B.E., M.A.
The Northumberland Heath Senior School, Erith

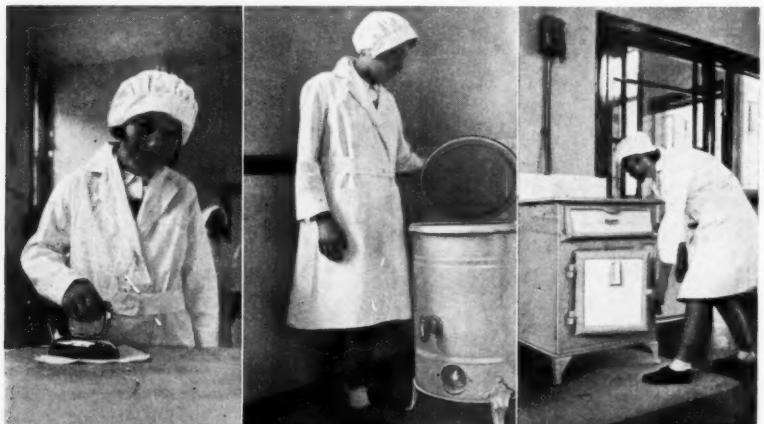
ALTHOUGH this is an electrical age the general public is not as yet sufficiently electrically conscious. There is, therefore, a need for education to train the future generation in understanding and using fully the many blessings which electricity can bring. The need for education to prepare the people for great changes in society is apparent in every direction, but in no case is this more necessary than in the creation of an electrical consciousness.

Modern civilisation can continue to exist only through the maintenance and improvement of the various means of communication, and it is apparent to all thinking people what part electricity takes in this co-ordination of world society. It is therefore encouraging to learn that the need for education in the use and control of electricity is being increasingly realised by the various education authorities. The most outstanding recent example of this is shown by the Erith Education Authority in the provision made at its Northumberland Heath Senior School, in which over a thousand children between the ages of eleven and fifteen years have just been accommodated.

The electric lighting fittings provided are adequate and even generous. The great hall and the classrooms have lamps fitted in opalescent bowls which diffuse the light pleasingly with the assistance of white ceilings and light cream walls. The effect is bright and attractive, and the generous provision of lighting points with fittings which obviate all glare gives a feeling of warmth and comfort in the rooms of the school.

Two-way Switching

Much thought was given to the placing of these light points and to their control. For instance, all stairways and corridor lengths have been fitted with two-way switches to obviate any need for walking downstairs in darkness. It is surprising how often this simple provision is forgotten when wiring schools. Another instance of switch control is found in the great hall, which is divided into two parts separated by a sound-proof folding partition and has a cinema projection house at one end and a dramatic stage at the other. The switching here is so arranged that all the lights in both halves of the hall can be put on or off from either end. This facilitates the control of the lights during a dramatic or cinematograph performance, and obviates the need for unsatisfactory systems of signalling. For the cinematograph arc lamp a rotary transformer changing a.c. to d.c. has been installed.



Students in the Domestic Centre enjoy their lessons in electrical housecraft

The corridors and covered ways are lighted by pearl lamps in bell-shaped pearl glass reflectors, and in the sanitary blocks elongated bulkhead lamps are fitted. On the school front, which is well set back from the road, external lamps on attractive iron pillars have been placed to light the entrances and the two carriage ways which lead up to them.

A power circuit has been installed for the operation of the following electrical gear: Vacuum cleaners and electric polishers for the floors; motor-driven machinery (yet to be supplied) in the handicraft rooms; motors connected with the heating plant, such as silent rotary pumps; drives and air blast for the automatic stokers which use a finely broken coal; and the sewing machine motors, &c., in the crafts rooms.

Two large electric cookers have been fitted in the two domestic subjects classrooms, and there are about a dozen electric irons in the same place, and electric hot-water equipment in both the boys' and girls' departments for the spray baths and for the special ablution bowls for children and staff. Electric water heaters are also fitted in the science rooms, where a supply of hot water is very necessary to dissolve chemicals and to wash both apparatus and hands. In the science rooms, also, arrangements have been made whereby the current from the mains is stepped down by transformers to a safe voltage for simple electrical experiments.

Clocks and Fire Alarms

A master clock over the great hall distributes, electrically, a standardised time all over the school. There are slave clocks in both halves of the great hall, in both staff common-rooms, in both head teachers' rooms, in the west court, which has a dwarf clock tower, and in one of the staircase turrets facing the playing fields. Thus, synchronised time is available at all necessary points, and it is possible to see one clock or another from every part of the school. Connected with the electrical time system are also electric buzzers which are placed in each classroom, and these indicate units of time which fit in suitably to the divisions of the school time-table. This synchronisation is very important in a senior school because students frequently change classrooms after a lesson to follow the specialist teachers and the specialised equipment. Fire-alarm points are placed at vantage positions in the school, and these are worked electrically.

Though the heating of the school is not electrical, yet the automatic stokers which fire the three hot water boilers are regulated and controlled electrically. Electro-thermostats are fitted to each boiler and these cut out or start the stokers when the temperature of the water rises above or falls below a definite point. Further, to obviate the necessity of the thermostats operating overnight or during week-ends and yet to keep the fires banked, kindling controls electrically connected to suitable clocks come automatically into action every hour.

There is yet another control to the heating system in which electricity plays a part—this is the "Variostat"—a device connected to an outside thermometer which, when the exterior temperature falls, causes the stokers to speed up their action and so raise the flow temperature of the water, anticipating in the classrooms the effect of the colder conditions outside. Similarly a rise in outside temperature results in a fall of interior temperatures so that equable conditions of heat are automatically maintained within the school.

Stage Lighting and Sound Amplification

A modern system of stage lighting has been installed, including footlights, sidelights, two battens of top lights, side floodlights and spotlights. These are connected, except the spotlight, to a switch and dimmer board of modern construction whereby the white and coloured lights can be mixed and dimmed to produce a great variety of lighting combinations. This dramatic stage will prove a great boon both to the school and to local dramatic societies.

Another educational feature which is now being worked out is the application of modern sound receiving, amplifying and reproducing apparatus to the needs of the school. A central set is capable of receiving and relaying to various points in the school broadcast talks and lessons, able to amplify in the great hall the speech and music on the stage, and also suitable for use in amplifying gramophone records in the great hall or to certain other quarters of the school. The adaptation of the apparatus to pageantry in the west courtyard, or for use in making announcements at school sports held on the playing fields near the building, and for similar purposes, is being borne in mind. Listening points for portable all-mains sets have also been provided in a number of classrooms.

Finally, a system of telephone extension lines will reach from a small exchange in the girls' department to the two head teachers, to the caretaker and to another school near by. These will be linked up through the school exchange to the Post Office system and the working of the exchange will be part of the education of the older girls (and possibly boys).

The electrical contractors for the school were Messrs. H. E. Keen & Co., Ltd., Westminster. The appliances were supplied through them by the General Electric Co., Ltd. (water heaters, cookers, irons, lamps and fittings); the Revo Electric Co., Ltd. (cookers and boilers); clocks (Gillett & Johnston, Ltd.); and the Strand Electric Co. (stage electrical gear).

Some Driving Forces in the Industry: Wm. McGeoch & Co., Ltd.

1. Mr. W. McGeoch (*Whitlock & Sons*), managing director of Birmingham works. 2. Mr. L. A. McGeoch, chairman and managing director, Glasgow. 3. Mr. C. W. Fraser, director, Glasgow. 4. Mr. A. J. McGeoch (*Jerome*), assistant manager, London. 5. Mr. A. A. Selkirk, London manager. 6. Mr. W. P. McGeoch (*Whitlock & Sons*), assistant manager, Birmingham works

A "Quick-heat" Hot-plate Switch

WHILE the economy of electric cooking has been proved and its advantages are now generally recognised, the comparatively slow heating-up is often criticised. Attempts to get over this difficulty have led either to the use of directly heated utensils (water boilers, frying pans, &c.), or, in the kitchens of large establishments, like hotels, to the practice of leaving one or more boiling plates on all the time—attempts at solution that are by no means satisfactory.

Manufacturers have gone to the utmost practical limits of increase in the rated loading, but along this path the desired heating-up speed could not be obtained. It is possible by special arrangement of the heating elements to increase the connected load and thus get nearer to the desired heating speed, but this sacrifices the possibility of providing a low heat for simmering. Even if it were possible to construct hot-plates with very high loading that were provided with a simmering stage, an efficient performance of the middle stage—*i.e.*, for frying—would be impossible without equipping the hot-plate with additional connections, which means that the real advantage of the normal arrangement is lost.

These difficulties are claimed to have been surmounted by the "Schnellheizschalter" (quick-heat switch) which, according to Dr. O. Vent in *Electrowärme*, provides the following advantages: Just as an electric motor can carry during starting many times its rated full-load current without suffering injury so long as the heating of the coils does not exceed a definite limit, so also a hot-plate can receive current much above its nominal load so long as a definite temperature is not exceeded. As in the case of the motor, dangerous overheating can be prevented by means of a protective switch operated by a thermostat. By the aid of a switch with thermostatic release the hot-plate can be overheated for a short time without injury. This is possible in two ways: (1) by temporary reduction of resistance; (2) by temporary use of higher voltage. The following notes will indicate the advantages of the second method.

If, for instance, it is desired to reduce the heating-up time of a hot-plate to one-third, then with both methods three times the current must be used. With the first method, in which the voltage remains unaltered, the resistance would have to be reduced to one-third, this one-third would then carry three times the nominal amperage. With the second method, in which resistance remains unaltered, the required heating-up load (3 VA=1.73 A×1.73 V) is obtained by raising the nominal voltage 1.73 times, and, therefore, increasing the current by 1.73 times. As the current flows through the entire resistance the disadvantage of unequal heating, which would result from the first method, is avoided, while an increase of current to 1.73 times is naturally to be preferred to a three-fold increase. Furthermore, with the first method additional connections to the hot-plate would be needed if the inefficient arrangement of incorporating thermo-switches into the plate itself is to be avoided.

No Alterations Necessary

With an a.c. four-wire system, or a d.c. three-wire system, different pressures are available without increase of line voltage. Through the insertion of the Schnellheizschalter it is possible, without danger to the plate, whose approximate safety limit of temperature has been allowed for, to use the voltage between the outer wires for giving a quick-heating start while for continued slow heating the voltage between the outer and central wire would be used in any desired gradation. The switching over from higher to lower voltage is achieved quite automatically by the switch which can be fitted to any electric cooker without altering either the existing plate or the ordinary control switches. An increase in the cross-section of the lead-in wires is usually unnecessary.

In systems with only one voltage, *i.e.*, a 3×220 a.c. with neutral wire, this switch can also be used if plates are employed whose rated voltage is less than the working voltage. If, with such a system, a plate is selected with, say, a nominal voltage of $220/\sqrt{3}=127$ V, then with parallel switching of the resistance we obtain, as in the previous cases, three times the rated current on the heating elements and a consequent shortening of the heating-up time to one-third. With series switching and slow heating, which automatically follows the initial heating-up, we obtain, with the same resistance, a quarter of the heating load. The load is suitable for frying, &c.

In this case we intentionally forgo the simmering stage and use the plate, as the higher loaded plate already mentioned, either as an additional plate for quick heating or for frying and ordinary cooking. Notwithstanding its much quicker heating-up we thus have the advantage of an ordinary hot-plate without any difficulty, as the automatic change-over switch effectively prevents damage or wastage of current.

Low-voltage Distribution. By J. Gardner

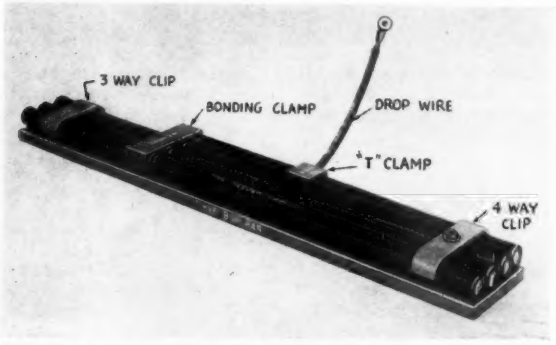
A simplified method for signalling, lighting and telephone systems

AN entirely new system of distributing heavy electrical currents has recently been successfully tried out for totalisator signalling installations at several race tracks and also in a number of telephone exchanges recently installed by contractors to the Post Office. This system aims at the reduction of the cross section of the main conductors, by linking them up into a common network which produces numerous paths for distributing a fluctuating load, thereby making use of lightly loaded portions to assist the other parts of the system and allowing a lower average current to be taken in calculating the voltage drop.

Some novel features, detailed in the following description, will no doubt appeal to engineers who are constantly handling similar problems of distribution, and they might find that, suitably modified, it could be extended to include power and lighting schemes for large buildings and factories with economical results.

Signalling systems for totalisators are usually worked upon two voltages, *viz.*, 100 V for the lamp nests in the indicators and 50 V for the switching mechanism. Automatic telephone systems operate at 50 V. One pole (the positive) is at or about earth potential and a common positive conductor is used throughout the distribution system in the case of totalisators. The same type of switchgear is used in both systems, and the present compact assembly prohibits the use of standard supply voltages for the indicator lamp nests.

A busy hour current drain of from 1,000 to 2,000 A is not uncommon in automatic exchanges in the London area and large provincial towns. The distribution of this current from the power plant to the switching equipment must be carried out with a maximum drop of one volt over a distance of



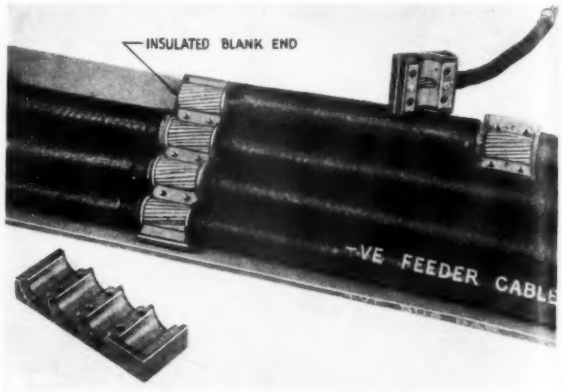
An assembly of four 37/.083 v.i.r. cables with insulated "T" and bonding clamps

200 or 300 ft. lead and return; this low voltage drop is necessary to prevent cross-talk and leakage in subscribers' circuits. A much larger voltage drop is permissible in totalisator equipment, as the conditions are quite different. Engineers who have visited some of the earlier exchanges have often expressed their amazement at the large cross section of the main conductors; in some cases they are no doubt on the safe side, but a simple calculation shows that the one-volt limit is mainly responsible for the provision of conductors which would carry a current greatly in excess of the exchange requirements.

An Uninsulated Positive

The new system first of all makes full use of the fact, already noted, that the positive conductors are at earth potential and are not therefore insulated from the surrounding structures. By using a flat copper or aluminium bar as positive conductor throughout the distribution area a ready means is provided for carrying and supporting the negative conductors which consist of ordinary v.i.r. cables. Owing to the longer distances between the generating plant and the indicators of totalisators, a cheaper metal is used for the positive conductors, the other cables being carried on this conductor; this arrangement forms a simple and convenient method when it is fixed to the supporting structure of the track enclosure.

The assembly illustrated forms the main feeders from the power plant and along the ends of the suites of switch racks; from this assembly a smaller flat copper bar carrying a single v.i.r. cable is run over each suite of racks (usually from five to nine per suite). These positive suite conductors are bolted to the underside of the main positive conductor, whilst the negative v.i.r. suite conductors are teed off from one of the set of main negative conductors by means of a special insulated "T" clamp resting directly on the



Showing clamps with top portions removed

positive busbar, a local fuse being inserted in the negative v.i.r. suite conductor for protective purposes. Each individual rack is then fed in a similar manner by a positive vertical busbar connected to the overhead suite busbar and carrying a negative v.i.r. conductor teed off from the negative suite conductor.

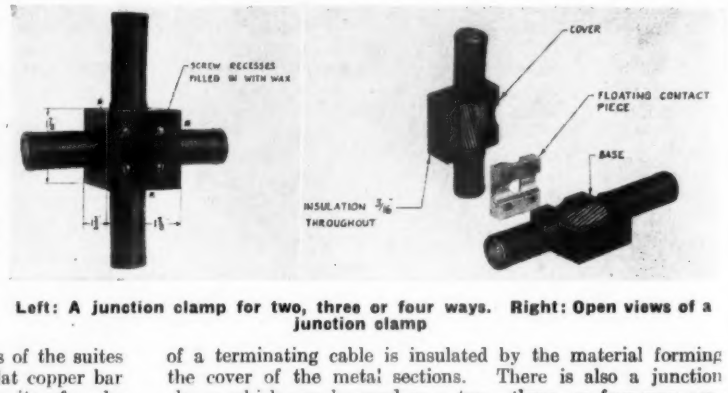
The rack feeder cables are provided with further "T" clamps and short v.i.r. connections terminating at a series of small fuse panels forming part of the shelf equipment of switches mounted on each rack. An illustration shows the method of teeing off the branch feeders and also the bonding clamps, which are used at each point where the cross sections of the main negative conductors are reduced as the load current diminishes towards the end of the system, eventually leaving one main feeder for the last two or three rows of racks.

Teeing-off Methods

The "T" clamps are of a very compact design and fit snugly over the v.i.r. cables, one side being recessed to prevent bulging the neighbouring cable. They consist of two brass sections covered with a moulded insulating material. The sections are adapted to fit over and under a previously bared portion of the main cable; the top section is arranged to accommodate the conductor of the branch cable through a cylindrical hole which partly intersects the channel formed for the main cable. The branch conductor is secured to this top section by two grub screws, which act as positioning guides when screwing the two sections together.

The insulating mouldings are recessed to fit snugly to the rubber covering of the v.i.r. cables and the two sections are held together by four screws which exert sufficient pressure to ensure perfect all-round contact, firmly bedding the branch conductor into the main conductor. The screw heads are recessed into the insulation and finally covered with wax or insulated discs.

Each clamp is tested to a pressure of 2,000 V and the contact resistance averages 0.00003 ohm. The bonding clamps are of similar design to the "T" clamps with the exception that there is no provision for branch cables and that the end

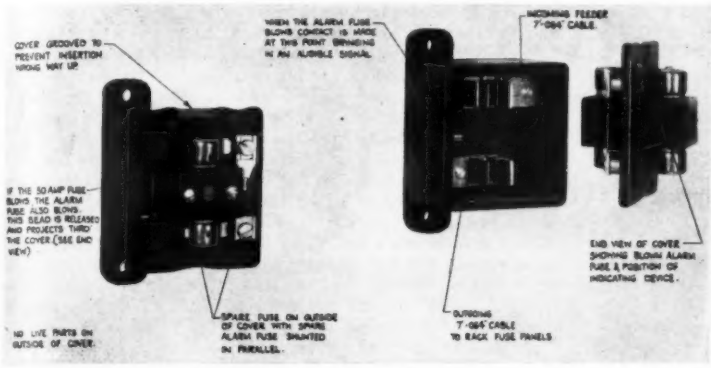


Left: A junction clamp for two, three or four ways. Right: Open views of a junction clamp

of a terminating cable is insulated by the material forming the cover of the metal sections. There is also a junction clamp which can be used as a two-, three- or four-way connector. This design is used principally in smaller systems

where there is only one protecting fuse and the cables are of the same cross section throughout.

A fuse mounting is employed which is designed to occupy minimum space and to provide an alarm feature when the fuse blows. The current-carrying portions of this fitting are enclosed in a moulded box, the cover of which houses a main and an alarm fuse on either side so that by reversing the cover a spare fuse can be put into circuit. The alarm fuse is of small capacity as in telephone circuits; it is shunted across the main fuse and its fusing releases a spring contact which brings in an audible or visual alarm either directly or through an associated relay. The arrangement is explained by the accompanying picture.


COVER GROOVED TO PREVENT INSERTION WRONG WAY UP
WHEN THE ALARM FUSE BLOWS CONTACT IS MADE AT THIS POINT BRINGING IN AN AUDIBLE SIGNAL
INCOMING FEEDER 7/064" CABLE
IF THE 50 AMP FUSE BLOWS THE ALARM FUSE ALSO BLOWS THIS LEAD IS RELEASED AND PROJECTS THRU' THE COVER (SEE END VIEW)
END VIEW OF COVER SHOWING BLOWN ALARM FUSE & POSITION OF INDICATING DEVICE.
SPARE FUSE ON OUTSIDE OF COVER WITH SPARE ALARM FUSE SHUNTED IN PARALLEL.
OUTGOING 7/064" CABLE TO BACK FUSE PANELS
NO LIVE PARTS ON OUTSIDE OF COVER.

A 30-A protected type fuse mounting with alarm device and spares

The system described could be employed in a ring-main system for a lighting or power distribution scheme using v.i.r. cables throughout. A chase and cover would be provided in new buildings to house these cables and these would be supported in the usual way by cleats, brackets, &c. The polarity or phase of each set of conductors is immediately identified by clamps and bonds, which are manufactured in standard colours. No soldering or sweated joints are necessary at any point in the system, and the bonding of the main cables at definite points enables a lightly loaded portion of the system to assist a heavily loaded portion, thereby maintaining an even distribution of voltage drop throughout the installation.

Kettering's Radio Relay System. By Thomas H. Hall

WIRELESS relay services are being rapidly developed all over the country, and practically all local authorities have received applications for a concession. Radio that can be obtained with the same ease as electric light has a popular appeal, and provided a high standard of reproduction is maintained the fact that the selection of programmes is limited will not deter intending subscribers. Obviously quality is of primary importance, and it is gratifying to observe the well-designed apparatus used all over the country.

From Broadcast House, the headquarters of "Radiomains," Kettering's relay service, dual programmes are radiated, chosen from the B.B.C. programmes, and supplemented by the more reliable foreign stations on Sundays. Two single-wire aerials are slung over the three-storey building, which is in the heart of the town; as electrical interference is therefore acute, "Goltone" screened lead is employed for the lead-in to the receivers on the first floor. Highly selective screened-grid and detector receivers are employed, incorporating "Ferrocart" iron-cored coils and a.c. mains valves. Screened leads run to the single-valve first-stage amplifier (Mazda "AC/HL"), which in turn feed power amplifiers with two Mullard "DO 60" valves, each stage giving 120 W dissipation. There are microammeters in the grids of each valve, and milliammeters in the anodes, while an ammeter shows the line load. The maximum undistorted output of each stage is 28 W.

Controls include those for automatic bias on each valve, switches to vary the ratio of the output transformers according to the load, and mains voltage regulators. Each stage has a gain control, and incorporates its own power supply. Valve rectification (Mazda "120/500") is employed. There are G.E.C. cut-outs in each 230-V a.c. mains lead. The whole apparatus, which is contained in metal cabinets, was constructed by Messrs. Partridge & Mee, Ltd., Leicester.

The amplifier outputs go to two main distributor panels, each feeding five pairs of lines in parallel through ½-A fuses. The two programmes run through ten-core cable to a main distributor post 150 yds. from the station, and then radiate in five directions. The cable employed is "064" s.c.c. rubber-insulated laid up in pairs, five pairs cabled together, taped, double braided and weatherproof compounded overall. Each line is protected by Philips lightning arrestors, twenty being mounted on the main post. Four wires are taken to each subscriber, 16 s.w.g. cadmium-copper wire, cotton lapped and lacquered being used for the main trunks, and 18 s.w.g. for the smaller feeders; no bare wire is employed. Rawhide suspenders from a catenary cable composed of seven strands of 16 s.w.g. galvanised steel wire support the multi-core cable.

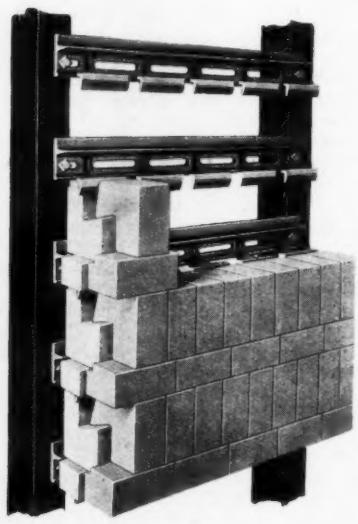
Some Details of the Kettering System

Left: The main distribution post and test box. Centre: The first-stage amplifiers and part of the power amplifying plant. Right: A typical installation with the four-core lead descending from the chimney band bracket

Test boxes to facilitate fault finding are placed at the junction of every feeding line. Band brackets are used as far as possible for chimney fixings, and four-core lead cable runs from the air lines down into the houses to neat programme boxes (three-way switches, giving programmes one, two, and off). The boxes incorporate two 1,000-ohm protective resistances, one in each lead. Permanent-magnet moving-coil speakers with 1,600-ohm speech coils are used, the resultant quality being all that could be desired, while a satisfactory volume level is maintained. "Radiomains" is owned by Mr. Paul Taylor, the well-known wireless retailer.

Suspended Walls for Combustion Chambers

IN place of the ordinary solid firebrick wall for water-tube boilers and other types of furnace, modern practice consists in using the "suspended" wall; that is, a series of firebrick blocks, each of which is carried separately by a steel framework behind. The latest designs of the "Bigelow" standard air-cooled suspended wall is manufactured in Great Britain, along with "Liptak" suspended arches, by Liptak Furnace Arches, Ltd., 38, Victoria Street, London, S.W.1, and the company has supplied about 160,000 sq. ft. of walls and arches at home and abroad (excluding the United States), typical installations being the boiler plant of the remarkable new Ford works at Dagenham, Trinidad Leaseholds, the Indian Copper Corporation, and an oil refinery at Port Jerome, France.



A "Bigelow" suspended wall with a special renewal facing wall in course of erection

Essentially, the "Bigelow" wall consists of three components—a cast-iron carrier, a high-grade fireclay block, and a standard firebrick, using a steel framework to which are bolted a series of cast-iron brackets with a flanged portion, having firebrick blocks attached. The latter are made with an indentation or groove at the top so that they hang suspended from the castings, and between each two rows of blocks ordinary firebrick squares are fitted. On these lines a wall can easily be built of practically any shape or size required, and installations are in use in London with some of the walls sloping inwards at an angle of as much as 54 deg. with the horizontal.

No pressure due to weight is exerted, so that the wall can be built to any height, and each individual block can be easily replaced without affecting the rest of the wall, while troubles due to expansion are eliminated and the allowances that have to be embodied in other forms of wall are not necessary.

The metal framework is usually covered on the outside with a simple type of outer casing, such as steel sheet lined with asbestos, and a current of air is passed continuously between the casing and the back of the wall, either by natural circulation or by means of an induced or forced draught fan, the heated air being available for combustion or other purpose. This air circulation, aided by the heat transmission properties of the metal framework, maintains the temperature at the face of the wall below the fusing temperature of the slag, and consequently the molten material does not adhere to the brickwork. The result is an increase in the life of the walls as compared with the ordinary solid wall, which is often rapidly deteriorated by slag.

A number of modifications of the standard "Bigelow" design are also available for special conditions, including renewal wall faces of a special material with the reserve or back part built of ordinary firebrick, on somewhat the same lines as the "Liptak" suspended arch, which has two layers of interlocking firebrick blocks.

Steel framework of the "Bigelow" suspended wall showing a combustion chamber under construction

An Indian Hydro-electric Scheme

THE plans for hydro-electric development by the harnessing of the river Munnar near Pallivasal in Travancore are now complete. When the scheme was originally drawn up its cost was set down at six million rupees approximately. Since then, however, it has been shown that additional expenditure amounting to a million rupees will be needed for the extension of the power supply to Alwaye and neighbourhood, bringing the total estimated cost of the scheme to a little over seven million rupees. Mr. N. V. Dorofeeff, who was the tunnel engineer connected with the Uhl River project in the Punjab, is the only non-Travancore engineer engaged on the Pallivasal scheme, which is designed to divert water from the Munnar River and lead it by a cut-and-cover channel through the ghats (hill range) about 10,000 ft. long, with a gradient of 1 in 350 and a finished section of approximately 7 ft. by 8 ft. From the tunnel exit, the water will pass through an open channel stilling pond and decantation chamber to a forebay, which is designed as a spillway tank. Two penstock lines will take off from the forebay, each of them designed to carry thirty cusecs of water, and each feeding a generating set. The power station will contain three generating sets, each of 5,000-kVA capacity, one of which will be a stand-by.

The transmission lines will be taken over the hills to the first tapping station at Kothamangalum, thirty-one miles from Pallivasal. These lines will consist of two circuits carried on towers of an average spacing of six to a mile. From Kothamangalum the line will be carried on to Alwaye. The main 66-kV transmission line will pass from Kothamangalum to Kottayam, a further distance of forty-three miles, and the main receiving station will be at Kootayam. Here, the voltage will be stepped down to 33 kV and the 33-kV lines will be taken to Alleppey, where the voltage will be further stepped down to 11 kV for local distribution. At Kottayam, the voltage will be stepped down to 11 kV for distribution in Kottayam town and neighbourhood. The 66-kV switchgear at Kottayam receiving station will control another 66-kV line going to Peerade for serving the planting area. All the receiving stations and sub-stations will be interconnected by telephones, carried on independent poles.

The main feature of the project is a proposal to develop a total output of 10,000 kVA without storage of water. Should further power be required a convenient site for storing water is available, and the capacity of the tunnel will enable the development of a maximum of 30,000 kVA. It is anticipated that a large amount of power will be consumed in the immediate neighbourhood of the generating station, where there are about thirty tea estates and factories which are already interlinked by an existing electricity system. Successful experiments have recently been carried out in utilising electric power for the withering and drying of tea, besides rolling and crushing, so that a large demand is likely to arise in this area. When the scheme is in full working order, it is hoped to link it up with the Quilon electricity supply. The tunnel is scheduled to be completed in twenty-six months, and the project is expected to be working in 1936.

Vacuum Tube Speed Control for Motors

ACCORDING to *Machinery*, a synchronous motor operating efficiently at variable speeds by means of a new-type vacuum tube control was recently demonstrated in the General Electric Company's test laboratories at Schenectady, U.S.A. The new control, a development by Dr. E. F. W. Alexanderson, is likely to be useful in many fields for operating a.c. motors at various speeds with remote control, an example being electric ship propulsion. With the turbine running at full speed constantly, the speed of the propeller motors can be varied by changing the frequency of the current fed to them through the vacuum tube control. Instead of the captain communicating orders to the engine room for a change of speed, the new apparatus makes it possible for him to regulate the speed of the driving motors directly from the bridge. The motor demonstrated was 400 h.p., and the efficiency of the frequency converter 98½ per cent.

Shipping and Engineering Exhibition. By A. Regnauld, B.Sc.

Increasing applications of electricity in marine engineering

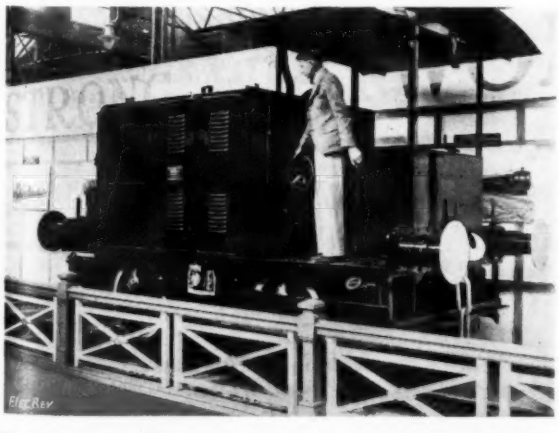
SIR ALFRED EWING during the course of one of his delightful addresses declared that science is the handmaiden of engineering. A visit to the Shipping, Engineering and Machinery Exhibition, which is being held at Olympia, London, from September 7th to 23rd, certainly justifies this dictum as far as the relationship of electrical science to marine engineering is concerned. Previous exhibitions—they have been held biennially since 1919—have led us to regard them as being essentially marine engineering exhibitions; but a visitor this year unacquainted with the official title might certainly be pardoned if he regarded it as an electrical engineering exhibition, for it is at once apparent that there is no branch of marine engineering in which electricity does not find a wide application.

Views of Olympia, London, where the Shipping, Engineering and Machinery Exhibition is being held

In describing the previous Shipping Exhibition in September, 1931, the ELECTRICAL REVIEW commented on the fact that a number of manufacturing concerns, more particularly electrical ones, that have hitherto catered for markets outside the marine business were finding potential customers amongst shipbuilders and shipowners. The present exhibition undoubtedly marks a further step in this direction and if, as the Earl of Athlone remarked in performing the opening ceremony on Thursday last, "the exhibition comes at an appropriate time of brightening trade prospects and should provide an impulse towards industrial recovery," then the electrical industry is obviously going all out to participate in that recovery. May its efforts meet with the reward they so richly deserve.

Effects of Depression

Unfortunately, shipping has felt more severely than any other industry the depression of the past years, and this is to a certain extent revealed in the present exhibition. The number of exhibitors is considerably smaller, there being no stands whatever in the gallery as in previous years, while among those who have been courageous enough to exhibit there is an obvious endeavour to reduce the expenditure involved, although the absence of excessive elaboration and decoration of the stands adds rather than detracts from the merits of the equipment shown. Still, one can assert without fear of contradiction that it is a good exhibition, and after a careful survey its two outstanding features appear to be, first, the extent to which electricity is being utilised in every branch of the shipbuilding and marine engineering industries and, secondly, the almost phenomenal growth of the high-speed heavy-oil engine.



The Armstrong-Whitworth 15-ton Diesel-electric shunting locomotive, which is shown in operation on a track specially laid down

Electrical Propulsion of Ships

I am somewhat disappointed that the use of electricity for the propulsion of ships does not make more rapid progress, although this is not due to any lack of recognition of the merits of the electric drive but rather to the present financial stringency, which causes shipowners to hesitate to incur the additional initial capital cost which the use of electrical propelling machinery undoubtedly involves. Even so, signs are not entirely wanting amongst the exhibits at Olympia that the possibilities of the electric drive are not being lost sight of. Thus, Crossley Brothers, Ltd., show an eight-cylinder *vis-à-vis* horizontal heavy-oil engine which is a duplicate of the engine installed in an electrically propelled ferry boat recently built for service at Hong Kong. On the vessel in question the engine drives a 300-kW d.c. generator and the installation has already proved an unqualified success.

There are many other high-speed heavy-oil engines in the exhibition which—as the makers are quick to emphasise—are particularly suitable for driving the generators for the electrical propulsion of trawlers, yachts, and other small craft. For larger vessels, such as ocean-going passenger liners, the steam turbine is better suited to driving the generators, and a model of the P. & O. liner *Viceroy of India*, with its two 9,000-kW turbo-alternators, serves as a reminder of the possibilities of the electric drive on vessels of this type.

It is, however, for auxiliary power that electricity makes its strongest appeal to the marine engineer. This is due to a very large extent to the rapid development of the motor ship on which, owing to the absence of steam, the electric motor is almost universally employed for driving the auxiliary machinery both in the engine room and on deck, the electricity being usually obtained from Diesel engine driven generators.

Such firms as W. H. Allen, Sons & Co., Ltd., and Belliss & Morcom, Ltd., to mention but two who in the past have specialised in the manufacture of steam engines for the driving of electrical generators, have extended their activities and now turn out some of the finest examples of the high-speed compression-ignition engine which the exhibition has to show. These engines are designed on extremely clean lines, many of them being of the compressorless type, and apart from their extensive application to the driving of the auxiliary generators on board ship a very strong case can be made out for their use on land when loads of the order of 200 kW are dealt with. Moreover, engines of this type are being increasingly employed for Diesel-electric rail-traction units, a fine example of a shunting locomotive of this type being shown on the stand of Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd. This exhibit is further noteworthy from the fact that the length of track of standard gauge upon which the locomotive runs is of electrically welded construction, the chairs being welded to metal sleepers, with the rails held in the chairs by wooden chocks in the usual way.

The steam engine for driving these small generators is not extensively represented, although there are a few small turbo-

generators to be seen, while as indicating that the steam reciprocating engine—beloved of the marine engineer—is far from being extinct, Belliss & Morcom, Ltd., show a two-crank compound engine direct coupled to a 50-kW generator, the set being similar to one supplied to a cross-channel steamer now being built for the G.W. Railway.

As an example of a large generating unit, mention may be made of the fine model exhibited by C. A. Parsons & Co., Ltd., of a 30,000-kW turbo-generator set as supplied last year to the Brighton Corporation. The model, which is to scale one-sixteenth full size, shows the turbine complete with condensing plant and feed-heating system, and represents the latest practice in turbo-alternator design. The same firm is showing a new gauge projector which makes the water level in a boiler easily visible on the firing floor.

Ventilating Systems

Strangely enough, the exhibition does not reveal many examples of the use of electricity for lighting purposes, nor, indeed, for heating, although there is plenty of room for new and improved ideas in these directions. A number of types of ventilating fans are shown, it being realised that, particularly on ships voyaging through the tropics, the cooling of the air in the cabins is a problem which demands as much attention as its heating. In this connection the provision of proper ventilation accompanied by the electrical conditioning of the air as shown by Ozonair, Ltd., is of considerable interest, and apparatus of this kind might with advantage be used on passenger ships to a far greater extent than is actually the case.

It is, however, when we come to consider the uses of electricity on board ship for communication purposes, operating various measuring instruments, and so on, that the exhibition makes its greatest appeal. Thus, there are a number of very fine displays of wireless telegraphy and telephony equipment specially designed to fulfil the exacting conditions met with in marine service, and a feature of this branch of the exhibition is the arrangement by the Marconi International Marine Communication Co., Ltd., in collaboration with the General Post Office whereby visitors can send telegrams free of charge to their friends at sea on British ships. Needless to add, extensive use is being made of the facilities thus afforded, and it should serve to bring home to the public that it is nowadays almost as easy to communicate with persons at sea as it is with those on land.

A notable development in ship's wireless equipment is the "auto-alarm" which enables a distress signal from another vessel to be picked up even when the operator is not on watch, and various examples of this essential piece of apparatus are to be seen. Apart from its use for communication purposes, wireless also finds numerous other applications on board ship. Thus, there are a number of examples of the direction finder, by means of which a ship can obtain an accurate bearing from a shore station or another ship, while a still more recent invention, the "echometer," is to be seen in one or other of its different forms whereby the actual depth of water beneath a ship's keel can be immediately and easily obtained.

It would seem almost impossible to improve the familiar magnetic compass, but the introduction of the electrically operated gyro-compass with its repeater cards, course indicators, and so on, has led to the improvement almost beyond recognition of the magnetic steering compass, and we now have the master compass operating various electrically connected repeaters and course recorders in various parts of the vessel. Again, it is apparent that the "telegraph" between the bridge and the engine-room, hitherto mechanically operated, is being replaced by electrically operated instruments by means of which not only can the navigating officer indicate to the engineer on watch whether the engines are to run half-speed ahead, slow astern or whatever it may be, but the desired number of revolutions per minute and the direction of rotation can be given, and he is also able to see how soon his orders are exactly obeyed. In fact, with the instruments now available the officer on the bridge of a ship can obtain an almost uncanny knowledge of what is happening in the engine room below. And as if this is not enough there are the loud-speaking telephones which enable him to hold easy speech with the engineer on watch despite the noise which is inseparable from a large machinery space.

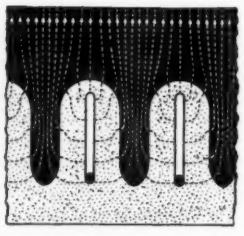
Before concluding this brief survey it may be of interest to draw attention to those exhibits dealing with the actual manufacture of the electrical equipment referred to above. In the annexe to the main hall are to be found a number of examples of the latest design of machine tools, such as lathes, shaping machines, grinders, &c., which are worthy of close study. In these days when economical production is essential, it is an unwise policy to use obsolete machinery, and these newer machines with their greater accuracy combined with enormously increased output may enable the cost of production to be substantially reduced.

In the same category is the use of welding, of the blow-pipe for profile cutting, of the electric furnace for tempering, and so on, all of which are amply exhibited; and since the testing of the finished product as well as of the materials used in its construction is a *sine qua non* if high grade production is to be achieved, attention may be drawn to the Philips "Metalix" X-ray testing apparatus which reveals the molecular structure of a welded joint or of a casting, as well as to the exhibit of the Department of Scientific and Industrial Research which is the first of its kind and serves to illustrate some of the many directions in which the research carried out in the Department's own establishments or in the laboratories of the allied research associations is assisting the British engineering industries.

Taken as a whole and not losing sight of certain very obvious shortcomings, it can be claimed that, despite the severe handicap under which it is at present labouring, the exhibition is, as Lord Stonehaven, the honorary president, said at the inaugural luncheon, a very creditable testimony to the technical skill, ingenuity, courage and perseverance of those engaged in the shipping, engineering and machinery industries.

Hot-plate Developments

THE Association of German Electricity Supply Stations (VDEW) has formulated standards of hot-plate performance which are claimed to meet all ordinary requirements in domestic service. Rapid boiling for the preparation of beverages and sharp heating for frying purposes demand, however, either the use of special appliances, such as immersion heaters and self-contained frying pans, or the use of hot plates with a higher specific loading (watts per sq. in.) than is employed in standard boiling plates.



Method of construction of the "Drakodyn-Rapid" hot-plate

On the hypothesis that a high rating hot-plate is the more generally convenient and economical solution, the Siemens Schuckertwerke has developed the "Drakodyn-Rapid" hot plate which is claimed to operate at a higher loading than has hitherto been employed.

The accompanying illustration, from *Elektrotechnische Zeitschrift*, shows above the zig-zag form of the heating element, and below the manner in which it is embedded in a moulding compound between the ribs of the hot-plate casting. The special advantage of this arrangement is that the lines of heat flow between the resistor and the hot-plate metal are exceptionally short. As a consequence, the temperature of the heating element does not exceed about 870 deg. C. (1,598 deg. F.), even when the plate is operated without a utensil. The standard sizes of the new hot-plate are 14.5, 18 and 22 cm. (about 5¾, 7⅛ and 8¾ in.) diameter, rated at 1,400, 2,000 and 3,000 W, respectively, with full, half and quarter heat control in each case.

Quantity of water heated from 20° to 95°C. (68° to 203° F.).		14.5 cm. (5¾ in.) plate.				18 cm. (7⅛ in.) plate.				22 cm. (8¾ in.) plate.			
		800 W.		1,400 W.		1,200 W.		2,000 W.		1,800 W.		3,000 W.	
		Standard.		Rapid.		Standard.		Rapid.		Standard.		Rapid.	
Litres.	Pints.	Time min.	kWh.	Time min.	kWh.	Time min.	kWh.	Time min.	kWh.	Time min.	kWh.	Time min.	kWh.
1.0	1.76	15.0	0.20	7.7	0.18	—	—	6.9	0.23	—	—	—	—
1.25	2.20	16.5	0.22	9.0	0.21	—	—	7.6	0.26	—	—	—	—
2.5	4.40	27.0	0.36	14.8	0.35	20.0	0.40	11.4	0.38	—	—	9.0	0.45
3.5	6.16	—	—	—	—	25.5	0.51	14.4	0.48	19.0	0.57	11.0	0.55
5.5	9.68	—	—	—	—	—	—	—	—	26.4	0.79	15.0	0.75
7.5	13.2	—	—	—	—	—	—	—	—	33.3	1.00	19.2	0.96

The table above, comparing the performance of German (VDEW) standard and "Drakodyn-Rapid" plates, shows that the latter practically halve the time required to boil water and, incidentally, effect at least 4 to 5 per cent. reduction in energy consumption.

The Progress of Electrical Science

Papers and Discussions at the British Association meeting

THERE is less of directly electrical interest at the British Association meetings in Leicester this year than usual, owing, perhaps, to the nature of the specialised local industries, which are hosiery, boots, and shoes. The attendance this year amounts to about 1,200, which is not far from the average of recent years, if we except such special meetings as the one at Oxford when the Prince of Wales was president and the centenary meeting in London two years ago. Next year the meeting will be held in Aberdeen, and Sir William Hardy, F.R.S., will be President.

The first paper of interest to most of our readers in Section G (Engineering) was given on September 8th by Mr. W. Wilson, who, as part of a general discussion on the use of the film in engineering, indicated how the film could be made to play an important part in interpreting the results of tests on switchgear. Their principal uses are set out as, first, the recording of the visual results of tests, more especially those effects which may be too transient for reliable detection by the eye, and, secondly, the keeping of continuous and simultaneous records of the readings of a comparatively large number of meters during a cycle test. The former is exemplified by tests on large oil-immersed breakers, high-speed air breakers, fusible cut-outs, and lightning arresters. In all these, the significant part of the test lasts only a short time, such as from one to seven cycles (20 to 140 milli-seconds), and requires only a few feet of film. The data supplied by the photographic record include the nature and duration of the arc—in the case of an air-break apparatus—the emission of flame, smoke, or molten metal, the duration and speed of any visible effects and, not least important, the moving or springing of the various parts; these records also measure with a close degree of accuracy their dimensions and duration.

Illuminated address for British Association: De Montfort Hall and Gardens, Leicester, lighted by Mazda lamps

One example chosen was from a film recording a dead short-circuit to earth at a grid sub-station and was taken out of doors while the blizzard of February 24th last was at its height. The arc was struck between a pair of horns by bridging them with a fuse wire prior to the closing of the main breaker. Besides showing the successive shapes assumed by the arc while it was extending, the film also indicates the relative intensity at the various stages, and its duration. The total length of the arc in this case was from 14 ft. to 20 ft., and extinction was brought about by the opening of the circuit breaker.

Behaviour of an Arc

Since the duration is short and the luminosity is intense, most arcing tests can be conveniently recorded by a simplified motion-picture camera. One described consists of twelve similar lenses each producing a separate image and uncapped in turn by means of an electrically driven rotary disc; from twenty-four to a hundred pictures may be taken per second, the speed being exactly measured. Tests with this camera show that the extinction of a d.c. arc is complete in $\frac{1}{4}$ sec., and of an a.c. arc in $\frac{1}{16}$ sec. The common theory is that the arc snaps at one point like a stretched thread, but the photographs prove that the arc persists until there is not sufficient electrical input to maintain its temperature and consequent ionisation, whereupon it fades away uniformly over its whole length.

Photographic recording gives a comprehensive and definitely correlated account of the behaviour of all the pieces of apparatus concerned in a test, enabling cause and effect to be seen together. The protection of rotary convertors by a high-speed circuit breaker was analysed. In order to obviate the destructive effects of flash-overs, the air circuit breaker must be able to open its contacts and break the circuit in 0.1 sec. or less. After both rotaries had been short-circuited and were beginning to flash-over, the film showed that the high-speed breaker had already begun to function; before 0.38 sec. had elapsed the flash-over was extinguished. The film showed that an apparent prolongation of the arc at the commutator of one machine was due to a transient recrudescence of the flash-over through a species of a.c. surge taking place while the circuit was actually broken.

Finally, an example of the second type of test film mentioned was shown, *viz.*, the simultaneous recording by the cinema of numerous quantities during a test cycle. This related to an assembly of no fewer than seventeen instruments employed during the sea trials of the 19-000-ton electrically propelled liner, *Queen of Bermuda*. The ship was out through a specified series of manœuvres, including starting, varying speed, and sudden reversal, and the various meters indicated the time, helm position, reading of the ship's log, voltage, excitation and speed of each of the two alternators and the armature current and speed of each of the four motors driving the propellers. By a study of the successive readings the transient effects at the various points of the cycle were determined.

Another paper dealing with the film in industry from a somewhat different angle was given in Section A (Technical Physics) on the same day by Mr. H. Warren (B.T.-H. Engineering Laboratory). He pointed out that the big valve amplifier and improved loud speaker had to be evolved before the electrical production of speech and music of sufficient volume and purity for successful presentation to large audiences became possible.

Talking Films in Industry

Since these improvements were manifested commercially in 1928 remarkable improvements have taken place. During the past few years photographic and sound recording, including the acoustics of materials and buildings, have made great strides concurrently. An illustration of one phase of this development was shown in one of the latest duplex exponential sound baffle loud speakers, which takes care of the lower frequencies (up to 3,000 cycles) and its companion high-frequency speaker (up to 10,000 cycles). These, together with the extended frequency amplifiers, were mentioned as the latest products of talking film reproducing development.

Speaking of the talking film as an industrial implement, Mr. Warren referred to the special possibilities opened up by the little 16-mm. talking film projector which can be carried into any ordinary office or room and put into operation with complete freedom from fire risk.

Special reference was made to a talking film illustrating the construction, method of operation and testing of a new large oil circuit breaker, developed and tested abroad as a concrete case of the talking film being employed for the transmission of technical information from one concern to another. The author believes that before long persons will be able to make their own 16-mm. talking films almost as easily as they can the little silent films. He referred to the value of the small talking film in salesmanship.

Speaking to Section A (Technical Physics), Mr. J. T. Randall discussed the question of spectroscopy in the service of industry. It was first used in a purely scientific sense, but in recent years has been of great practical utility. Manufacturing processes often depend in a vital way on the presence or absence of minute traces of foreign substances. The hardness and characteristic properties of steels, for example, may depend on the presence of nickel or tungsten, and three mil-

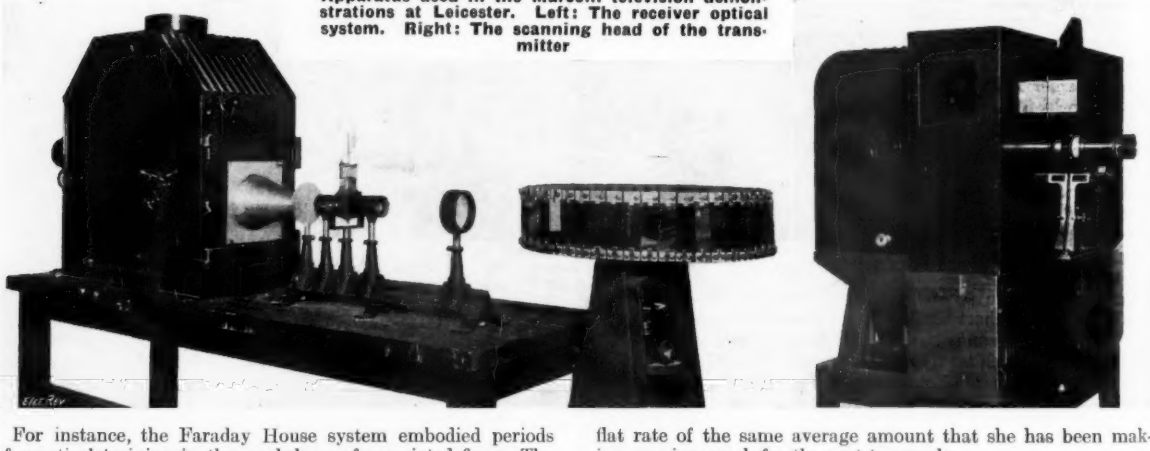
lionths of a gram of thorium oxide can be detected in a fine tungsten wire weighing only 60 millionths of a gram. A method for examining such specimens has been developed in the G.E.C. Laboratories at Wembley. In a similar way traces of iron in sands used for glass making can be detected, as can impurities such as lead, iron and manganese in copper and zinc alloys.

Rare gases and metallic vapours also emit characteristic colours when excited electrically; as the pressure of mercury in a specially designed discharge tube increases, so the colour of the light changes, making it more suitable for road lighting with an efficiency two and a half times that of a filament lamp of the same energy consumption.

X-rays have also been of great service in the identification of various materials. All solid substances bend X-rays, but no two substances do it in exactly the same way. The hot wires of electric fires must have a special adherent oxide coating, and X-rays help to distinguish the good coating from the bad; the behaviour of the filaments of our wireless valves also depends on the state of combination of the active materials, in which connection X-rays have also been of considerable service.

Technical Training Schemes

In the course of a discussion in Section L (Educational Science) on September 8th, Dr. H. Schofield explained the "Loughborough Scheme of Engineering Training on Production," in which an attempt has been made to introduce commercial reality into the technical training of the young engineer. Several schemes for combining theoretical and practical training had been tried, but none of them with great success.



Apparatus used in the Marconi television demonstrations at Leicester. Left: The receiver optical system. Right: The scanning head of the transmitter

For instance, the Faraday House system embodied periods of practical training in the workshops of associated firms. The scheme was good on the whole, he said, but the "gap" period of a year was too long, and unless the associated firm took its duties very conscientiously the practical training of the pupil might be neglected. Some of the more progressive firms had apprenticeship bays where productive work was put through under rather more careful and more intensive supervision; this scheme had much to recommend it. The "sandwich" system was perhaps the most common method of linking theory and practice, but as a rule too little time was given to theory, largely on the ground of expense and difficulties in internal administration consequent upon the time taken from the productive workshop.

Dr. Schofield said that in Loughborough the lecture rooms and laboratories exist side by side with the workshops of the commercial factory in the same set of buildings and under the same control. The students are organised on a "week in and week out" system over a period of five years. On the academic side during this period the course follows a somewhat similar line to that arranged for the ordinary engineering degree, with possibly a rather more commercial and practical curriculum; such subjects as economics, a modern language like Spanish, and psychology of industry are given rather special attention. On the practical side during two and a half years, or one half of the normal period of training at Loughborough, the student receives experience in all sections of productive engineering output, from the foundry to the drawing office, from the machining and fitting shops to the tool room. He is brought up against the problems of estimating, costing, and selling, and is engaged in interesting productive work throughout the whole course.

The instructor must be an unusual man, always an experienced craftsman, a man sympathetic towards the training of young people, widely tolerant in his views, and definitely wedded to his vocation. It was not easy for an instructor to part with his best worker immediately that worker could safely be trusted to carry on without attention, yet obviously it was just at that point that the student must pass on to another department. Each instructor, therefore, was constantly up against maintaining output and delivery according to promise with labour upon which he could not, with any degree of confidence, rely.

In Section J (Psychology), on September 7th, Miss A. G. Shaw (Chief Supervisor of Women and Motion Study Investigator of Metropolitan-Vickers) gave an address on "Motion Study Applied to Small Assembly and Machine Work." The study is concerned with the assembly of small electrical meters and instruments, and most of the operators are girls of approximately twenty-three years of age who have been on the work for several years. There is usually only one on each operation, which in some cases lasts for the whole week, but in others for a few hours only.

The methods devised by Lilian M. and Frank B. Gilbreth in America are practised, viz.: (1) process charting giving the picture of a job as a whole; (2) micromotion photography measuring the nature and type of the movements; and (3) chronocyclegraph study for analysing the path of the movement. By process charting every deviation from the standard practice becomes obvious, and stages come to light which are not at all apparent in the work itself or in a written description of it. In micromotion photography motion pictures are taken of the operator's movements with a clock in the field of view. The film is projected and analysed, and then shown to the operator and any others who wish to see it. Once an improved method has been completed, as a result of the analysis, an operator is trained to do the job, and another to act as substitute. The operator is assured that she will get a flat rate of the same average amount that she has been making on piece work for the past ten weeks.

The average increase in the daily production per operator of all investigations carried out in the three years the section has been in existence is over 100 per cent. This is due to simplification and elimination of all unnecessary movements; operators take more interest in the work.

The Unemployment Problem

Professor Miles Walker, F.R.S., contributed a paper to Section G (Engineering) on Tuesday, in which he dealt with some of the engineering projects which, he believed, promised a fair return and would employ hundreds of thousands of workpeople. He also considered methods of finance, similar to those proposed in America, for enabling the people to purchase the things they had made or for contributing to the cost of the future wealth-producing projects.

Many of the proposals made in the past for the cure of unemployment entailed the expenditure of large sums of money on public works. The first consideration in the minds of their sponsors was the spending of money so that wages might be paid to those brought into employment. The second consideration was the choice of some work which (but for the present urgency of finding employment) would probably come at some future date. It was argued that in choosing the work to be done we must not put someone else out of work.

This way of looking at matters, he said, was wrong. The main object should be to create as much wealth as possible with the least expenditure of money; one should employ as few men as possible on any individual work, as there was no limit to the number of men who could be employed because there was no limit to the work waiting to be done.

Had the control been in the hands of engineers, the manufacture of all the things wanted by the people would probably have been started in this country and in the Colonies on an immense scale within a year after the war.

Lamps and Lighting

Discussions at the Public Lighting Conference

DURING the discussion of the paper on "The Lighting of Seaside and Health Resorts," read by Mr. W. N. C. Clinch on September 5th before the Association of Public Lighting Engineers, Mr. S. B. Langlands (Glasgow) said that in the floodlighting of the past there had been far too much harshness, and Mr. W. J. Jones (E.L.M.A. Lighting Service Bureau) submitted that light and shade should also be introduced into the general illuminations at any seaside resort. He urged the Association to consider the possibilities of providing all-night lighting everywhere, especially in seaside resorts during the season.

Prof. E. W. Marchant (president, I.E.E.) stated that the illuminations at Blackpool last year had caused between 300,000 and 400,000 visitors to go to the town. Mr. Justus Eck deprecated the use of the word "floodlighting," because it gave the impression that every object treated should be flooded out with light; he had discovered, by practical experiments, that beautiful results could be obtained in gardens with a very small amount of illumination.

The Lamp of the Future

The discussion on electric discharge lamps took place on the afternoon of September 6th. Mr. C. C. Paterson (director of research, G.E.C. Laboratories, Wembley) believed that the public would prefer the high-pressure mercury lamp to the sodium lamp. An advantage of the latter was that it could be made in smaller units than the mercury lamp, but its colour was a great disadvantage; the beauty of an object practically disappeared, because the whole object was a monochrome, but no doubt the sodium lamp would have a vogue for some purposes. Up to the present, taking the average performance of lamps throughout their lives, the efficiency of the sodium lamp was no higher than that of the mercury lamp, which for 90 per cent. of its life had a sensibly constant candle-power. The mercury lamp was simple, for it had only a choke coil in series and could be screwed into an ordinary lamp socket. He hoped that lighting authorities would make use of these more efficient lamps not to lessen their existing expenditure on lighting but to improve present power standards. We had now the opportunity of rendering our streets accident-proof at night.

Prof. E. W. Marchant said that the lamps described provided an admirable illustration of the great advances that could be made by the long-continued application of scientific principles. The comparatively low intensity of discharge was a great advantage, as electricity had had a bad reputation at one time for lighting owing to excessive brightness of the filaments. Mr. L. T. Minchin pointed out that the isocandle diagram of a unit in an installation of high-pressure mercury-vapour lamps mentioned in the paper showed that a considerable amount of light at above 75 or 80 deg. was reaching the road at such a point that it could not increase the illumination on the road, but it did decrease the sensitivity of the eye, and a mere increase of the area of the source of light did not decrease appreciably the glare effect.

Mr. E. C. Lennox (Newcastle-on-Tyne) suggested that while it might be important in shopping centres to be able to distinguish colours clearly in most other places the more important consideration was good visibility. The maintenance cost of discharge lamp installations seemed to be about the same as that of equipment used with other lamps of similar wattage; the all-in cost, including maintenance, capital and current, would represent only a very small increase as compared with increased value of the discharge lamps. Mr. J. W. Partridge (Paris) said that the more light available the less was the glare. In Holland he had seen an installation of sodium lamps on both sides of a road, the fittings being placed in such a way that there was practically no glare. Mr. H. W. Gregory referred to an installation of discharge lamps on a section of roadway extending to the centre of a shopping parade, where the remainder of the shopkeepers had requested the local authority to continue this lighting along the road in front of their shops also. This indicated that shopkeepers did not object to the light from discharge lamps, which from its distant source did not affect the colour of their goods.

Turning night into day in the Winter Garden at Margate. G.E.C. equipment including "Osira" lamps was used

Mr. Wilson, replying to Mr. Minchin's reference to glare, said that in the particular installation referred to there was a high intensity at angles near the horizontal which produced the high road surface brightness. Had a cut-off been used on those fittings the effect would have been to cut off the bright streaks on the road, and to give a restricted band of light under each lamp. If road brightness were maintained, a fair amount of glare could be permitted, as Mr. Partridge had indicated. He felt confident that uniformity of road surface brightness was the key to good visibility. Replying to Mr. Allpress, he said the unit using the discharge lamp gave 20 per cent. of the light on the road surface. Thus, the reduction in the efficiency of the unit as regarded the road lighting was only 3 per cent., but the lamps gave 2½ times as much total light as the lamps previously used. He and his colleagues had found that after being at work in the light of sodium lamps for some time they became used to it. His impression was that the effect of high-pressure mercury-vapour lamp illumination was to make objects appear crisp. He disagreed with Mr. Harper that the visual photometer was out of date. The application of the photo-electric cell would come, but for the moment he would advise lighting engineers to stick to their visual photometers. The length of time required for discharge lamps to attain their normal brilliance was for some of the types four minutes, but for the sodium lamps it was about ten minutes.

Illuminated windmills make a pretty spectacle at the tramway shelter at the Aquarium Terminus, Brighton

In Ireland

The development of street lighting by electricity in the Irish Free State was discussed on the day following. Mr. E. C. Lennox (Newcastle-on-Tyne) commended the policy of the Free State Electricity Supply Board in charging the same figure for 100-W as for 200-W lamps. The lighting rates in the Irish towns mentioned in the paper varied between 8d. and 1s. in the £, whereas in England the average was less than 5d. Mr. T. Wilkie (Leicester) said that Mr. Algar's figures showed that the average cost per lamp was from £3 to £3 2s.; in Leicester the cost worked out at about £4.

Mr. L. T. Minchin suggested that the criterion of lumen output should be not the total of a light source but the lumen output within a given cone. Mr. H. S. Allpress (Birmingham) suggested that illumination should be used not only to light a street surface but to give a general bright appearance,

and the striving for absolute efficiency sometimes tended to increase glare. Mr. F. C. Smith said that the only credit given in the B.S.S. was for light which actually reached the road surface. Candle power should be defined when tendering, and the much decried "onion" diagram should be submitted. A larger proportion of the flux from a gas source was in the lower hemisphere than in the higher hemisphere; with electric light sources the reverse was true. The light could be redirected, but not with 100 per cent. efficiency.

Mr. G. H. Wilson (Wembley), referring to the policy of switching on the lights half an hour after sunset each night throughout the year, pointed out that twilight was longer in summer than in winter and it was not necessary then to switch on the lamps so soon after sunset. Mr. E. J. Stewart stated that in Glasgow diffusing glass had been placed around the light sources, preventing glare and improving visibility, but the brightness was reduced. Unsolicited opinions from the public, including motorists, were in favour of this method. The arcs still used in Glasgow gave greater efficiency in sheer luminous output than did filament lamps of corresponding wattage, but as maintenance costs were higher filament lamps were being substituted.

Mr. Algar, replying to the discussion, said that there were no refractors in the fittings used in the standard lighting systems, but they were used in the city lighting of Cork and Dublin. The standard height of units was 18 ft. In reply to Mr. Brydges, he said the Board had compulsory power with regard to fixtures on buildings, but had never used it in connection with street lighting. Usually there was no difficulty in securing permission to attach fixtures. The Board did not sell electricity at so much per unit for street lighting. An inclusive annual charge was made per lamp for a fixed service. The average price covering these services was about 2d. per kWh, which covered installation and everything connected with it. In no case had a single penny spent on street lighting been charged against consumers. The Board worked on Government capital, and was compelled to recoup the entire capital expenditure on these installations separately from other charges. All lights (outside Dublin city) were controlled by time switches. Normally, 20-A switches were used, so that one could operate twenty 200-W lamps; lamps on isolated poles were controlled in each case by a 5-A switch. The price of electricity to the ordinary consumer was 1d. per kWh, plus a weekly rate based on a valuation of the premises.

French and Indian Experience

In the discussions on the papers on the street lighting of Paris (Mr. J. W. Partridge) and the development of public lighting in the city of Bombay (Mr. J. P. Blackmore, read by the hon. secretary, Mr. J. S. Dow), Mr. J. F. Colquhoun (Sheffield) said that experience in Paris agreed with his own in that directive fittings throwing the light diagonally across a street reduced glare. Mr. C. Harper (Barking) drew attention to the new remote control by photo-electric cells, which did not depend on the clock or the calendar, and also operated in case of fog. Mr. E. Stroud said he had been pressing for the introduction of the two-filament lamp into Great Britain, so that the higher-power and lower-power filaments could be used at appropriate times. By means of such lamps street lighting could be greatly improved.

Mr. E. E. Sharp submitted that the remote control system to be applied in Paris was not very new. The instrument did not impress him as being able to function for any long period. Such a scheme involved difficulties, unless there was a very specialised network already up to its ultimate capacity, and he could not imagine such a network existing in any modern town. There was also the difficulty of getting the instruments tuned in and keeping them tuned in. In loaded mains the signal current either did not get through or it had to be impressed at such a high voltage as to jeopardise lamps and other apparatus on circuit.

Mr. L. E. Buckell (London), discussing the use of lamps having two filaments, asked why Mr. Partridge considered it of real importance to reduce the light intensity during the latter part of the night, because, having regard to the low price of electricity to-day, reduction of consumption for a comparatively few hours of the night would reduce the total cost of street lighting by only a trivial amount; on the other hand, the maintenance of the standard of lighting was a great asset from the point of view of policing. Mr. Smith (Gas Light and Coke Co.) related, as his experience, that the photo-electric cell was far more costly than the clock controller; it had not been entirely satisfactory, and often introduced accounting difficulties. If lighting had to be reduced during certain hours it was desirable to reduce the power of the units rather than to extinguish some of them.

Mr. Partridge, replying to the discussion, said that the existing gas lighting would be replaced by electricity in the next six years, so that to replace existing upright burners by inverted burners at this stage would result in further expenditure rather than economy, for the average life of the new burners would be only about three years. In some of the very small streets the amount of traffic passing after 8 or 8.15 p.m. was practically nothing, and it was possible, though perhaps not very desirable, to reduce the lighting in those streets at 9.15, instead of at midnight. But, as soon as sufficient funds were available, the higher lighting intensity would be maintained until midnight. Photo-electric cells could be used for the control of street lights, but he found it better to control the lights from central points, so that all the lamps in a street could be lighted at the same time.

The Annual Meeting

The annual general meeting was held on September 6th. In the report of the Council's activities reference was made to an examination with a view to granting a diploma for members. It has been decided to collect data comparing the expenditure on public lighting in various towns during the past three years with a view to discovering the effect of the financial stringency on developments. The section on public lighting progress during 1932-33 contained reports from members in various towns throughout the country which showed that the installation of directive reflectors and refractors continues. The call for economy is resulting in greater use of automatic control, but in some areas cheaper electricity or gas has resulted in an advance from part-night to all-night burning.

Mr. Alexander Forbes, of Aberdeen, was nominated as vice-president for 1933-34, and Messrs. H. Davies Chesterfield), S. B. Langlands (Glasgow), and T. Wilkie (Leicester), all past-presidents, were re-elected as members of the Council.

An invitation has been accepted to hold the 1934 meeting in Aberdeen.

Standard Nomenclature for Welding

THE Standard Nomenclature Definitions and Symbols for Welding and Cutting which has just been issued by the British Standards Institution (B.S.S. No. 499) has two distinct and definite objects. One is to establish agreement as to the exact meaning to be attached to terms that have become associated with welding practice, and the other is to draw up a standard system by means of which the form and details of welded joints can be readily indicated on engineering drawings.

Terms have been grouped under five main sections as follows:

Section I.—Definitions of general terms applicable to all forms of welding and also including cutting terms.

Section II.—Definitions of methods and joints relating to forge welding.

Section III.—Definitions of methods, terms and joints relating to pressure welding.

Section IV.—Definitions of methods, terms and joints relating to fusion welding.

Section V.—Definitions of terms relating to welding and cutting equipment and supplies.

A complete alphabetical index has been included, and where desirable, in order to prevent the possibility of misunderstanding, illustrations and diagrams have been inserted.

For the indication of welds on engineering drawings the Committee has in place of diagrammatic symbols put forward a system in which a capital letter is used to indicate the general form of joint, such as "B" or "T" for a butt joint and tee joint respectively, and a combination of numbers and suffix letters is appended to indicate the particular form of weld, and there is also a statement of the dimensions to be given.

Details of the working of the scheme are given in full, together with an explanatory chart; an illustration of each form of fusion welded joint is included and a weld symbol given.

So far as the symbols for indicating welds are concerned, the standard will become an essential adjunct to B.S.S. No. 308, Engineering Drawing Office Practice, in which the usual symbols used on engineering drawings are standardised.

Copies of the new publication (British Standard No. 499, 1933), can be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d., post free.

Navigation and Traffic Control Lamps

An addendum (under reference C.D.(ELG) 833) to British Standard Specification No. 161-1932, giving schedules for navigation lamps and for lamps for road traffic control light signals will be forwarded to those interested gratis (on receipt of a stamped addressed envelope) by the Publications Department of the British Standards Institution, 28, Victoria Street, London, S.W.1.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

The Heating of Lampholders

I should be interested to have the opinion of some of your readers more experienced than I am in the use of holders made of a substance of the bakelite type.

In connection with a fairly large commercial installation which my company recently completed, we were asked to provide a certain number of pendants complete with bakelite holders suitable for 100- or 150-W lamps. This equipment was provided with an average good quality brass lined lampholder of this type. We now find that in several positions 100- and 150-W lamps have been burning for 20-24 hours a day, and whilst the flexibles are in quite good condition the lampholders themselves are burnt black and the brass lining has expanded and split the bakelite, so that it is impossible to remove the shade carrier ring.

The manufacturers inform me that I cannot expect a bakelite lampholder to carry a 150-W lamp, in spite of the fact that the E.L.M.A. said that either B.C. or E.S. caps were standard.

I had to give my client the alternative of either 100 W or 150 W, and he insisted on bakelite holders. I should be very glad to know from other readers if their experience with bakelite holders agrees with mine.

MORTIMER HAWKINS,
Managing Director,
Mortimer, Gall & Co., Ltd.

London, E.C.2, *September 8th.*

Several novel and impressive effects are obtained at the new "Empire" Cinema, Edmonton (See page 368)

An Alternative Severn Scheme

I am very interested to read Mr. J. W. Meares's communication regarding the possibilities which he considers lie in store for hydraulic power accumulation, in particular with reference to the Severn Barrage Scheme. No doubt some of your readers will remember the article on the technique and application of hydraulic power accumulation which appeared in your journal in December, 1929, pages 1131/4, and February, 1930, pages 242/7. In that article I indicated that apart from the purpose for which the grid was intended it could also serve a secondary useful purpose as transmission lines to and from suitable hydraulic accumulation sites.

In my calculations it was indicated that high heads were not an essential nor even the existence of natural reservoirs. Installations have now been in successful operation on the Continent for many years employing heads as low as 100 ft., and having entirely artificially constructed reservoirs. Many of the grid lines traverse very suitable country such as Cumberland, where a trial installation would involve little extra expenditure except on plant. Operated on a reasonably large scale the overall efficiency obtainable from electricity drawn from the line to electricity returned to the line can reach 70-75 per cent. Apart from capital charges the loss will be counterbalanced by improved thermal efficiencies through operating the steam stations on a more even and better load factor. The capital charges would be less than corresponding generating plant extensions which will eventually be necessary assuming the present rate of growth and type of load.

According to estimates it is likely to be a further ten years before plant extensions actually will be required, but unless we meanwhile find ways and means for improving load factor, then hydraulic power accumulation will eventually form the cheapest method of meeting the rising load curve. Most probably my suggestions at the time were premature for the engineers in this country fully to appreciate their significance, but with the completion of the grid constructional work, now would form an admirable time to make a commencement with this further step, particularly as it would come at a very opportune time as regards furthering employment, and essentially as it will be an inevitable consequence.

A. PAGE.

London, S.W.16, *September 11th.*

The Water Problem and the Grid

I see that this morning's *Times* devotes a considerable amount of space to the water famine, but I am glad to note that it does not favour the idea of a water grid. The electric grid is the solution of the problem; with the rapid penetration of electricity into rural districts the water and sewerage problems can be cheaply and effectively dealt with by local pumping plants. The electric system adequately meets the whole position with a very considerable saving of capital ex-

penditure as compared with what would be the case were a supply of electricity not available.

I had personal experience a few years ago of the saving to be effected by utilising the electric system for automatic pumping purposes. I was preparing an electrical distribution layout for a town council which had at the same time a scheme under consideration for dealing comprehensively with the town sewage. It was proposed to construct a number of ejector stations connected by air mains to a central power station. I pointed out that as they were contemplating an electrical undertaking they could save the expense of air mains run all over the town and the power station. This was eventually done and a transformer at each ejector station point supplies electricity to an automatically controlled motor pump, and the use of electricity in this way has caused an enormous saving of capital. I believe the saving was almost equivalent to the expenditure on the electricity mains for the whole town.

Here, I think, is room for a campaign amongst rural authorities, consulting and local engineers, who deal with water and sewage schemes, to press the advantages of electricity for these purposes. Judging by recent utterances of the Minister of Health it would get the support of that body and undoubtedly the support and help of every electrical organisation. Model schemes could be prepared and circulated, giving estimates of cost and operation for various outputs, and photographs and descriptions with capital cost and running costs of installations in actual use. From my own experience in several cases of automatic electrically driven water and sewage pumping outfits, I am convinced that many thousands of horsepower could be added to the electric mains of the country. But the possibilities opened up are very much greater than this as electricity spreads through the countryside. There are no pumping operations, whether those of big water undertakings or fen and land drainage schemes, that would not show enormous savings by conversion to automatic electric pumping. Some of these stations are 5,000 and 10,000 h.p., and the expense of their maintenance is a serious burden on the undertaking.

Such a campaign as I have indicated would have to deal with the financial side of the question, which should not be difficult as practically all these works are under public control and good security could be given.

Building land development would be assisted by automatic pumps which would bring into use hundreds of acres "below local sewer level." The transformer and pump would be the nucleus of the sub-station to supply the building estate, but for Heaven's sake don't let "*Danger—Keep off*" be painted on it—rather let it tell the electrical tale. Such a campaign would add 200,000 h.p. to the electricity mains of the country in a short time. A. HUGH SEABROOK.

London, E.C.2, *September 8th.*

Round or Flat Pins?

Mr. Rudd's and Mr. Willis's letters in your issue of September 8th have been brought to my attention. I am at present in Cornwall so must trust to my memory.

As regards Mr. Rudd's comments he will find that I have not suggested that flat pin plugs cannot be made satisfactorily—on the contrary, I have actually mentioned that square, triangular, or any other shape could be made. These could be good if properly designed, with plenty of material and embodying good workmanship. Nevertheless, the round-pin type has inherent advantages which make it better still if properly designed.

What I do contend is that all sections of the industry should heartily support and even *insist* upon universal interchangeability. We have a standard specification to work to—true the tolerances hitherto allowed in this specification have been on the fine side and have not always been adhered to—hence at times the plug of one maker not properly fitting the socket of another. Now that the specification is made much wider, insomuch that only the pin dimensions are laid down and "springy" and "floating" contacts insisted upon, a perfect job can be made and at the same time interchangeability is assured.

I can assure Mr. Willis that no discourtesy was intended in my letter of August 25th, but as the amended specification only came out in February of this year I thought it might have escaped his attention.

Rather than dissipate our energies in getting out an unknown number of designs I suggest that supply engineers and contractors give every encouragement to using plugs and sockets made to Specification 372. C. L. ARNOLD,

Cornwall, *September 11th.* M.K. Electric, Ltd.

Imea

A very convenient habit has been formed in recent years of referring to associations by a name which is built up from the initial letters of the concern. We have, for instance, Beama, Era, Eda, Nalgo, Besa, Elma, and a host of others. Curiously enough, the Incorporated Municipal Electrical Association has not yet fallen into line. It is sometimes known by its full title (which is a mouthful) and at others as I.M.E.A. Actually, the word Imea would be convenient and musical. Perhaps the authorities will consider this suggestion. IMEA.

September 11th.

Diversity Factor

In Mr. Ferns' article entitled "A Domestic Tariff" in your issue of September 8th the term "diversity factor" is employed, apparently to indicate the ratio of consumer's maximum demand to the demand at time of system peak. I suggest that this is the reciprocal of peak responsibility, and not what for a long time has been regarded as diversity factor, namely, the ratio of the sum of the individual maximum demands to the simultaneous maximum demand.

Mr. Ferns remarks that "the suggested tariff gives the small consumer plenty of incentive to employ inexpensive but helpful appliances which can be used even on lighting-circuit outlets; for example, smoothing irons, soldering irons, shaving outfits, bowl fires, toasters, percolators, small kettles, &c." I would call his attention to the Home Office review of electrical accidents, 1932, recently published, in which it is stated that, out of a total of seventy fatal accidents, fourteen appear to have occurred on premises of a domestic character, of which nine were due to the use of defective portable apparatus. Moreover, if the loading of such appliances exceeds 2 A, their use from lampholder adaptors would contravene Section III (B) of the I.E.E. Regulations for the Electrical Equipment of Buildings. H. SHACKLETON.

Manchester, *September 9th.*

Neon Sign Protection

In the article on "Neon Sign Protection" by Mr. E. A. Beavis in your issue of September 8th reference is made to the I.E.E. Regulations for the Electrical Equipment of Buildings, and a statement is made to the effect that these do not appear adequately to cover these installations.

Apparently, Mr. Beavis is not aware that an addendum to these rules has been issued, dated March 9th, 1933, in which special reference is made to the nature of the cable to be used in these installations. Paragraph 156 states definitely that the "outer layer of the insulation of the cable must be of ozone-proof material," and 156 (B) states that "it shall be covered with a close-fitting metallic sheath." Furthermore, the necessity for sealing the end is taken care of by paragraph 150 (B), which specifically insists upon protection from the effects of ozone of the stripped-back portion. A porcelain-terminal sealing end of my design has been in use on signs erected by Messrs. Claude-General Neon Lights, Ltd., for the last three years with very satisfactory results.

Protective relays are unnecessary provided that adequate clearances are given against discharge to earth; but, if it is felt that some protection is required, there are several very good devices on the market which provide for cutting out the defective section of glass, leaving the remainder operating satisfactorily. The advantage of this is that there is no connection whatever between these cut-outs and the primary circuit, such separation being a most desirable feature in apparatus of this character. C. HIGGINS.

Wembley, *September 12th.*

New Insulating Compound

ACCORDING to *Elektrotechnische Zeitschrift*, the Central Association of the German Electrotechnical Industry has extended the classification of rubber-free insulating moulding compounds by a new type Y, the only representative of which is at present the material "Mycalex" made by the A.E.G. This consists of a mixture of mica powder and glass which is subjected to high pressure in steel dies at a temperature above the sintering point. The product is hard, greyish-white in appearance, and combines the advantages of mouldability, high mechanical strength, and ability to retain pressed-in metal parts, with resistance to heat and arcing, high dielectric constant and low dielectric loss. The sp. gr. of the material is 3.3; strength 1,200-3,900 kg. per sq. cm. in compression, 600-700 kg. per sq. cm. tensile, 1,000 kg. per sq. cm. bending, 5 cm.-kg. per sq. cm. impact; hardness 3-4 mohs scale, 40 scleroscope; coefficient of expansion 0.00001 between 20 deg. and 500 deg. C.; heat resistance 400 deg. C. Martens test; breakdown strength 15 kV per mm.; dielectric loss, tan $\phi = 0.015-0.020$; dielectric constant 8. Moisture absorption is nil, and the material can be machined with Wadia or similar hard cutting compounds. The new material is recommended for use in condensers, radio apparatus and other high-frequency applications demanding low dielectric loss; pin and suspension insulators; heating apparatus; arcing chambers and baffles in switchgear; and vacuum-tight lead-through connections.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Combined Lamp and Time Switch

The "Herald" alarm clock-lamp produced by GADGETS, LTD., 84, Waterford Road, Walham Green, S.W.6, will serve as an ordinary table lamp, a reliable time-keeper, an alarm clock, and an automatic time switch.

A push-button switch controls the light, and a suitably marked revolving shade serves as the clock dial and operates in conjunction with a stationary hand. There is provision for pre-setting the alarm for any time, while a switch can be similarly set to close and operate an auxiliary circuit (such as a radio set or an electric kettle) at any required time. The price is 37s. 6d.

The "Herald" alarm clock, time switch and lamp

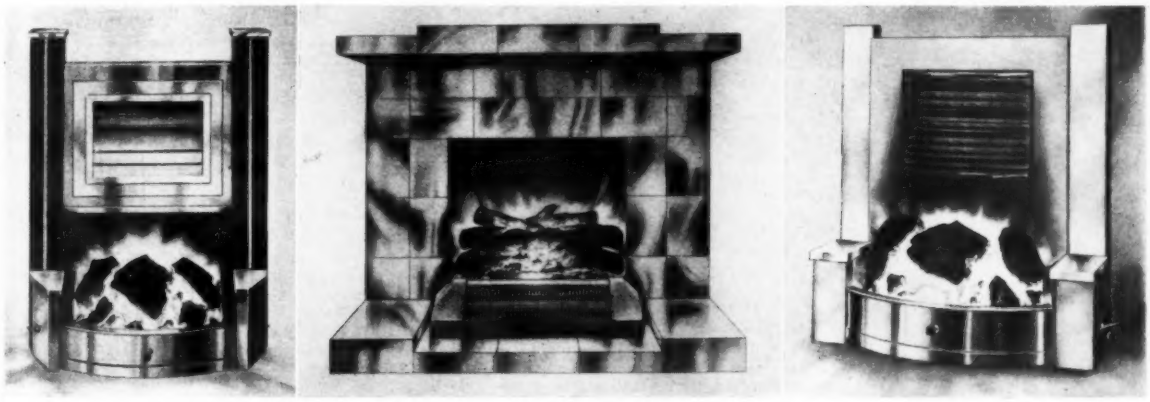
New "Magicoal" Fires

The accompanying illustrations depict three fires introduced for the new season by MESSRS. BERRY'S ELECTRIC, LTD., Touch-button House, 85-86, Newman Street, Oxford Street, W.1.

The "Beauberry," which is to be sold at £3 19s. 6d., is fitted with the company's new "Plus" fuel, and is loaded at 2 kW. Standard finishes are oxidised silver and copper, but the fire can also be supplied in art enamelled finishes at 4 guineas.

The "Flectaberry" introduces the company's new parabolic heater and "pencil" element, which is fitted with a new type of end pressure contact. It is of very attractive design and is made in various coloured enamelled finishes. Two models, 1 and 2 kW, are supplied at 5 guineas and 6 guineas respectively.

To meet a demand for a log fire which will fit into ordinary slow-combustion openings, there is the "Adjustalog," which has a 2-kW heater in the form of a trivet in front of the "fuel." The fire can be adjusted to fit openings from 16 in. to 20 in. wide, and it is listed at £4 15s.



The "Flectaberry," "Adjustalog" and "Beauberry" fires

An Oval Boiling Ring

The oval hob of the new boiling "ring" introduced by MESSRS. BELLING & CO., Bridge Works, Southbury Road, Enfield, Middlesex, enables two cooking utensils to be used simultaneously—an achievement for a loading as low as 1,000 or 750 W. The alternative lower loading is intended to permit more or less emergency use on the lighting circuit in the sick room, &c.

The Belling oval top boiler

The hob is of cast-iron and the body of sheet-steel, all finished in mottled grey vitreous enamel. The overall dimensions are 12¼ in. long, 6¼ in. deep, and 4½ in. wide, and the outfit is supplied complete with 2 yds. of flexible cable for 18s.

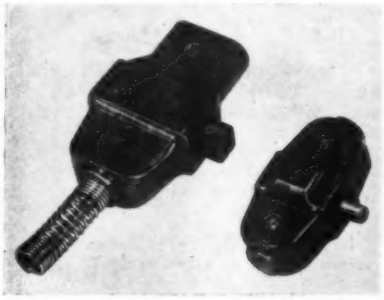
The "Karadio" Battery Charger

A £4 battery charger for motor-car and radio accumulators is a new product of LANCASHIRE DYNAMO & CRYPTO, LTD., 94, Petty France, Westminster, S.W.1.

It will charge 2-, 4-, 6- or 12-V accumulators as it adjusts itself automatically to the voltage of the battery. Operation is from a.c. mains, and it is small and compact. For those who want it to charge car batteries a special attachment is supplied for fixing to the steering column. This attachment is permanently connected to the battery *via* a length of armoured cable; to commence charging it is only necessary to plug the lead from the charger into the attachment.

Improved Switch Accessories

The feature stressed by MESSRS. WARD & GOLDSTONE, LTD., Frederick Road, Pendleton, Salford, in connection with a new "Bakelite" through switch and a similar heater switch and plug connector is that the interior sliding bar is of porcelain and is consequently unaffected by any arcing which may occur on breaking contact.



The "Goltone" heater switch and plug connector and through switch

The tendency of the moulded slider, the makers say, is to roughen and ultimately burn, whereas with porcelain these risks are entirely removed. Both devices can be supplied in walnut, brown, black, white, or other coloured finishes.

Portable Power Factor Meters

A unique feature of a portable power factor finder and circuit analyser, incorporating the Shotter patent, recently introduced by ELLIOTT BROTHERS (LONDON), LTD., Century Works, Lewisham, S.E.13, is that its indications are correct irrespective of the way in which the leads are connected to their particular pair of terminals, thus enabling the p.f. of polyphase unbalanced circuits to be analysed.

The Elliott portable power factor finder

The instrument works as a very sensitive differential wattmeter, and measures the single-phase power factor of a circuit. It consists of a sensitive detector, potentiometer rheostat, and a small change-over switch.

In measuring power factor the rheostat is adjusted until the detector gives no deflection, when the p.f. can be read directly on the scale of the rheostat corresponding to the position of the switch. The approximate range of the instrument is unity to 0.25 lag and 0.25 lead, and the scales are about 4½ in. long. There is an external zero adjusting device for the detector.

The standard instrument

has a nominal rating of 230 V, 5 A, but it can be used for current of from 0.5 A to 7.5 A at from 100 V to 250 V, with ample sensitivity. The current-circuit consumption is about 3.6 VA (0.5 p.f.), and the consumption of the potential circuit is 10 W at 230 V. The list price is £6 17s. 6d.

A Two-volt Accumulator

The new "MDG" 2-V, 45-Ah accumulator which has been introduced by the FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex, at 8s. is a smaller edition of the "LDGH" 60-Ah "Mammoth" plate accumulator.

"Mammoth" type plates ensure balanced working, and with indestructible perforated and ribbed ebonite separators, are housed in a high-quality moulded English glass container measuring 6⅝ in. high, 5¼ in. long, and 3¼ in. wide.

Retaining bosses on the case accommodate a wire spring, non-slip detachable handle. A moulded lid, with polarity signs, is equipped with double grease cups, a large moulded filling vent, and non-interchangeable moulded terminal nuts with raised polarity signs.

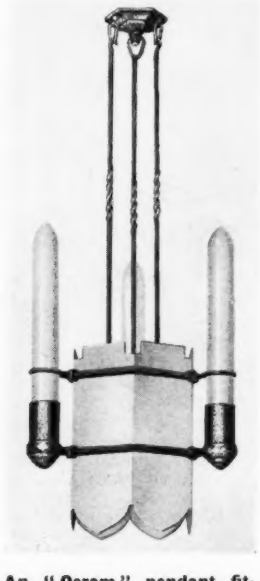
The "MDG" accumulator

Tubular Lamp Fittings

"Osram" opal tubular lamps have been developed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, specially to provide an artistic light source for the modern trend in illumination.

Unlike the company's old candle lamps, the tubular equipment is designed to give good lighting, as well as to provide decoration. The amber and pink lamps are particularly attractive. The new equipment is suitable for show-cases and panel lighting in positions where it is not practicable to use "Striplite" lamps.

Very attractive pendant and table fittings employing these tubular lamps are available. A 40-W or 60-W tube lamp costs 6s. white and 6s. 6d. tinted.



An "Osram" pendant fitting with one 60-W pearl and three 40-W tubular lamps

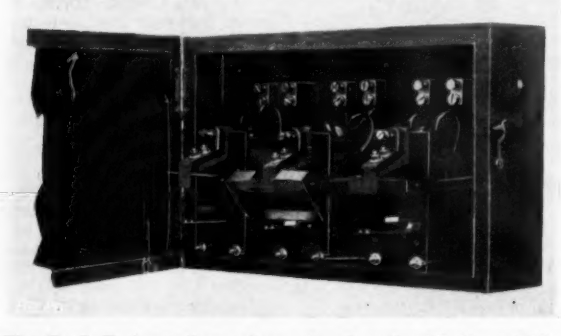
Low-voltage Alarm Device

Low-voltage alarm equipment recently introduced by MESSRS. PRICE & BELSHAM, LTD., Tamworth Lane Works, Mitcham, Surrey, is designed to give an alarm signal should the voltage on a line fall below a pre-determined limit. It is not intended to indicate variations in voltage due to variations in load, but only those such as arise from some fault requiring immediate attention. The unit can be permanently connected to a line, the rated voltage of which is, say, 230, at which voltage the current taken will be only 15 mA, and the signal would be given should the voltage fall below, say, 180.

The equipment is essentially a relay with a very light armature, so arranged that by a screw adjustment it can be set to give the alarm at any desired voltage within wide limits. Even when used on a.c. it is almost perfectly silent, so that it can be installed almost anywhere without causing annoyance.

The usual arrangement is three relays, one for each phase, in a neat wall cabinet of polished teak, but two-relay and single-relay units can be supplied. The actual signal is given by a bell operated by a battery, so that it can be relied upon to work even in the event of a total failure of the supply. If, in a three-phase set, the failure is on one phase only, then that phase is indicated.

The bell continues to ring until the relay has been set by hand, and for the purpose of testing the alarm circuit any relay can be tripped by hand without dislocating the apparatus. The relays can be arranged for use on either a.c. or d.c.



The P. & B. low-voltage alarm signal unit with the middle relay in the "fault" position and the cover over the phase terminals removed

Extended Range of "Incorporated" Motors

The "built-in" induction motor was developed by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, as the result of co-operation with the leading British machine-tool makers. It consists of a wound stator without a frame or endshields, and a rotor without a shaft or bearings, these missing parts being provided by the machine-tool maker as integral parts of the machine.

The ranges of stators and rotors have been recently considerably extended, and the accompanying illustration makes an effective comparison between one of the larger and one of the smaller units. The outside stator diameter of the large unit is 16¾ in., and that of the small one 3⅜ in.

Ten-h.p. and one-h.p. "built-in" induction stators and rotors

The large motor is for building into a centrifuge, runs at low speeds, and is rated at 10 h.p., 600 r.p.m., while the small unit is for use on a portable drill, running at 9,000 r.p.m. and being rated at 1 h.p.

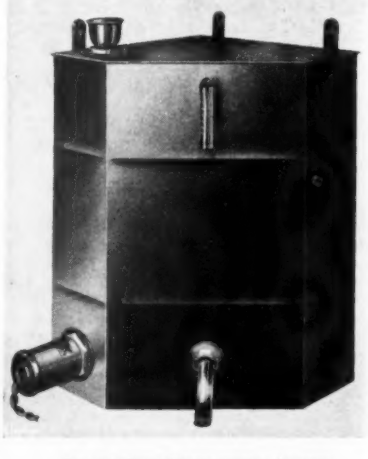
Non-automatic Water Heaters

Although having many years' experience in domestic water heating generally, the GEYSER MANUFACTURING CO. (1932), LTD., 1, Goodwin Street, Fonthill Road, Finsbury Park, N.4, is a newcomer to the electric water-heating field.

The company is now introducing two styles of non-automatic water heater, angle and "D" patterns, each in two sizes, 9 gal. (3 kW) and 12 gal. (4 kW). They are of the non-pressure type with hand control for both the heating circuit, and the water inlet supply, the internal water arrangement being push-through.

An immersion heater is disposed horizontally at the bottom of each tank and a specially marked thermometer is on the front near the top. Single- or three-heat control is available in each case, and all models are obtainable finished in white or coloured porcelain enamel or in oxidised copper.

A 9-gal. angle-pattern heater finished in oxidised copper costs £6 15s., while a 12-gal. "D" pattern unit in porcelain enamel is listed at £9 17s. 6d.



An angle-pattern water heater

Refrigeration in the Far East

IN the Far East, as elsewhere, the demand for ice has increased rapidly in recent years. At Singapore, for instance, the consumption is about 5,000 tons per month, the greater part being used by the fishing industry, and a large quantity of electrical equipment, including generating plant, switchgear, and motors ranging up to 180 h.p., has recently been manufactured and supplied by the General Electric Co., Ltd., for use with refrigerating machinery out there.

The Atlas Ice Works, Singapore, are designed to produce ice of high quality and clearness at the rate of 50 tons per twenty-four hours. The complete installation of electrical, mechanical, and ice-making equipment (for which the consulting engineers, Messrs. Wakeford & Lowndes, of Singapore, were responsible) operates at a high efficiency, which enables ice to be sold to the public at the extremely low figure of 0.28d. per lb.; this compares very favourably with the price of ice in England, although in the Straits Settlements water is more expensive and a far higher temperature (averaging about 75 deg. F. in the shade) prevails, while the average air temperature in the daytime is about 90 deg. F. with about 85 per cent. humidity. The erection of the entire building, plant, and machinery was completed and ice was being produced within nine months of the original order being placed.

A 400-V, 3-phase, 50-cycle a.c. supply for the 50-ton ice plant and also for a previously installed 20-ton plant is obtained from a 280-kW, 333-r.p.m. G.E.C. alternator driven by a 420-b.h.p. "National" oil engine of the vertical six-cylinder four-cycle type. The engine and alternator are running continuously at about 80 per cent. of full load. The various engine auxiliaries are driven by "Witton" motors, the air compressor for starting purposes being coupled to a 10-h.p. slip-ring motor, and the water-circulating pump (for cooling the engine cylinders) to a 3-h.p. 1,400-r.p.m. squirrel-cage motor with star-delta starter. The various circuits are controlled by a five-panel G.E.C. switchboard, comprising one alternator cubicle, three oil-immersed motor panels controlling two 500-A and one 200-A feeders, and one 50-A air-break distribution panel for supplying the small motors.

The ice-making plant works on the usual refrigerating cycle, employing anhydrous ammonia as a refrigerant with dry compression provided by three compressors. The main ammonia compressor is a three-cylinder two-stage vertical machine by Messrs. J. & E. Hall, directly coupled to a 180-h.p. 416-r.p.m. induction motor; there are also two horizontal reciprocating compressors previously installed and driven through belting by 125-h.p. and 100-h.p. motors. As it is essential that ice for the local market shall be clear and hard, compressed air is injected into the water during the freezing process. The blowing plant delivers air at 15-20 lb. per sq. in., and consists of duplicate rotary-type air compressors directly coupled to four 20-h.p. 980-r.p.m. motors. All the compressor and blowing plant motors are of the slip-ring induction type with oil-immersed rotor starters. The G.E.C. has also supplied a number of smaller motors and control gear.

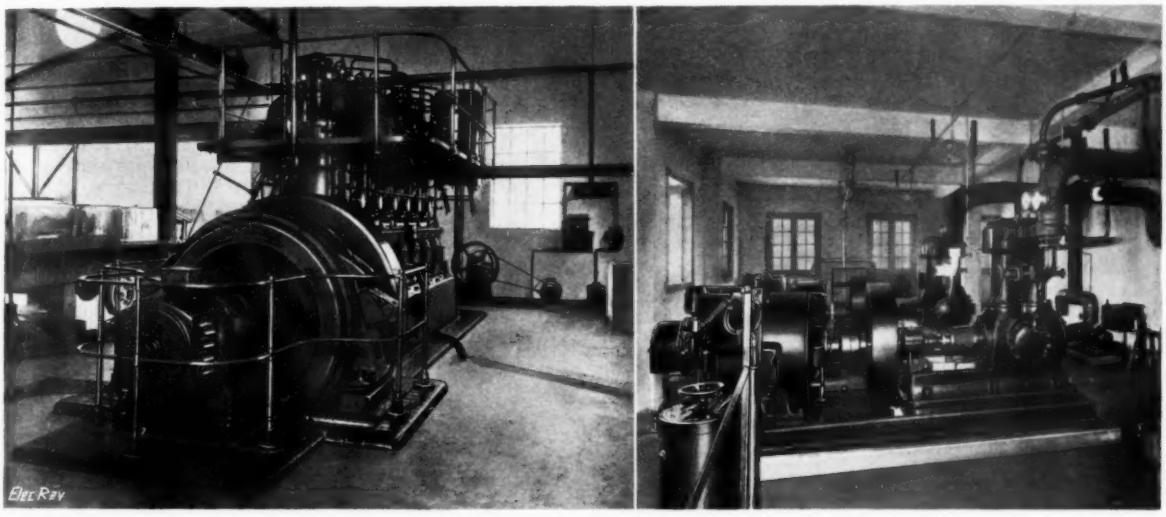
A Brewery Installation

Modern refrigerating equipment is also a feature of the new building of Malayan Breweries, Ltd., Singapore. In addition to a large number of motors totalling 155 h.p., the whole of the switchgear and cables, together with a complete lighting and ventilating installation, was supplied by the G.E.C. A bulk supply at 400 V, 3-phase, 50 cycles is taken from the Singapore Municipal Electrical Department through a main 400-A oil circuit breaker, whence it is distributed to the power circuits through a second oil circuit breaker and three air break switches, and to the lighting circuits through a triple-pole air-break switch fitted with neutral link. A recording kilowatthour meter and a voltmeter, together with suitable ammeters reading across the various phases, are also provided.

Refrigeration with specially lagged cold rooms is essential if beer is to be stored in the tropics, and two vertical Sulzer compressors are installed, each belt-driven by a 50-h.p., 1,450-r.p.m. "Witton" slip-ring motor with oil-immersed rotor starter.

Also two smaller Borsic compressors and a malt mill are driven by 6-h.p., 950 r.p.m. squirrel-cage motors with star-delta starters, and several small motors are provided for auxiliary drives. About two miles of Pirelli-General 3-core v.i.r. lead-covered and armoured cable was used for the motor wiring.

The lighting installation comprises about 200 points, and employs Pirelli-General tough rubber sheathed and v.i.r. cables with "Magnet" Bakelite switches and lampholders. "Osram" lamps are used throughout. The brew room is illuminated by "Britalux" fittings. "Genalex" synchronous electric clocks are installed in all parts of the building, and adequate ventilation in the offices and the European quarters is provided by twenty "Everest" electrically driven ceiling fans.



Left: A 280-kW 333-r.p.m. G.E.C. oil-engine-driven alternator at the Atlas Ice Works, Singapore. Right: Two 70-h.p. 360-r.p.m. "Witton" slip-ring motors, driving main compressors at the Singapore Municipal Abattoir

The Singapore Municipal Abattoir

As pork is one of the chief meats consumed by the large Chinese population of Singapore and pigs may only be slaughtered in the municipal abattoir, the latter has to handle daily a very large quantity of pigs, necessitating suitable refrigeration plant. The electricity supply is at 400 V, 3-phase, 50 cycles a.c., and refrigeration is provided by two Lee-Howell compressors.

Each machine is directly coupled through flywheels to a 70-h.p., 360-r.p.m. "Witton" slip-ring motor, each controlled by a triple-pole oil-immersed switch with a no-volt and two overload releases and time lags, together with an oil-immersed slow-motion type rotor starter. Two small water-circulating sets, each consisting of a Briton pump directly coupled to a 7.5-h.p., 1,450-r.p.m. motor, and two small brine-circulating sets, consisting of similar pumps driven by two 7.5-h.p., 1,450-r.p.m. motors, are also installed; these motors are of the squirrel-cage type with oil-immersed star-delta starters. The air in the cold rooms is circulated by a fan driven by a 5-h.p., 950-r.p.m. motor with air-break star-delta starter.

Acknowledgment for permission to publish this description and the accompanying photographs is made to the directors of the Atlas Ice Works; to Mr. R. L. Hastie, managing director of Malayan Breweries, Ltd., and Messrs. Fraser & Neave, Ltd., the distributors of "Tiger" brand beer; and to Mr. Fraser, the Singapore municipal engineer (with Mr. Macdougall, the engineer in charge of the abattoir).

Some Points to Watch. By Nina Dyson Rayner

ALTHOUGH electricity from public mains has been available for the last half century, its use for domestic purposes has not made the strides that its advantages would warrant. This is due mainly to the domestic applications of electricity having been left, until recently, in the hands of a public lacking in the requisite experience to get the best results.

Until the past few years much of the apparatus available was unreliable, so that even with electricity at low rates, repair bills, plus inconvenience, held up progress. A step forward has recently been made in domestic consumption due to improvements in the design of electric cookers, which will form the main domestic load. The need for a quick boiling hot-plate continues. The two main types on the market are the open spiral and the enclosed plate. The former is cheaper to manufacture and, although it does not suffer from the effects of liquids boiling over, it is more difficult to clean; the latter, although taking longer to get really hot, retains the heat for a considerable time and is suitable for continuous work.

At last I have found a rapid boiling plate which can be fitted to any of the leading makes of cookers. It is of the radiant type, and gives glowing heat the moment the current is switched on. A plate rated at 2,000 W (with a low heat for simmering) will boil three pints of any liquid from cold in just under nine minutes in any ordinary type of kettle or pan. This compares very favourably with the gas ring, especially as all fumes are eliminated.

Cookery lectures, which are given on several days of the week at the showrooms of various supply authorities, are too apt to consist of a dull lesson on cooking, leaving out all details of the operation side. The audience must be educated as to the best means of applying their own ideas of cooking to the new oven. Special mention of the average cost of each method, also the advantages of cleanliness, purity, &c., should be made.

Lower Hire Charges Necessary

Now that reliable cookers are available, supply authorities would increase their output of electricity if they devoted the revenue from hiring them to consumers to organising cooking campaigns. The minimum period for which a consumer may hire a cooker is usually too long, preventing many would-be customers from trying out new types. The hire charges for all electrical appliances are still too high to make them popular among consumers.

A consumer is apt to wonder why a city with a population of 770,000 has but one showroom, while a town with 20,000 inhabitants can maintain an equally attractive centre. At least one "viewing ground" should be available for every 50,000 inhabitants, or, either alternatively or in addition, a travelling showroom.

The all-electric principle for houses where little or no paid help is available would be taken advantage of more readily if only the consumption of various appliances was explained in non-technical language by a competent representative when electricity was first installed in the house. I remember one instance in which the husband complained about the amount of electricity that the vacuum cleaner and iron consumed. His wife asked me how many hours she could use either appliance for a penny (all energy above 200 kWh per quarter is charged for at ½d. per kWh). I explained that with her cleaner twenty-eight hours' service could be expected for a penny, as the higher-priced kWh would have been used for cooking, whilst with a 5½-lb. iron, 4½ hours' work could be done for the same amount. As a result additional labour-saving devices have been installed, including an electric toaster which automatically discards the toast as it is cooked, and a small motor to work the sewing machine. I tried the latter as soon as it was fitted and at once realised what a boon it would prove to be in a household where there was a quantity of sewing always on hand.

Meeting the Artisan's Requirements

It is not always wise to endeavour to persuade a man earning under £4 per week to consider using many electrical appliances. His one coal fire situated in the kitchen-living room has more often than not to cook a goodly portion of the meals, heat all water, both for the bathroom and for drinking purposes, provide warmth for the room and also heat flat irons, &c. Yet, as the home of the artisan is in the majority, we must not neglect to consider the revenue that is being lost to the supply authorities through this fact not being given adequate thought. In many cases electric lighting has been provided in such houses, and in some suburbs a generous gas company has fitted fires free of hire charges in at least one of the downstairs rooms! No doubt the gas consumption compensates it for this generosity.

Too often the lack of service after sales which the buying public has every right to expect is the cause of progress being hindered. The lack of interest, delay in despatching orders, and general apathy displayed by assistants in some of the stores is to be deplored. One can only trust that in the future managing directors will employ at least one trained and fully qualified woman to see that both the manufacturer and the buyer get a fair deal.

A General Advance. By J. C. Petersen

THERE has never been in the history of our industry a time so full of promise as the present. It is our duty to forget sectional interests as much as we can and work for the progress of the whole. From developments that are taking place in various directions it is obvious that what has been is small in comparison to what is in prospect. The need of to-day is a general electrical advance everywhere inspired with the determination that our commodity shall win its way to every place where it can render better service than any other agent is giving.

Notwithstanding all the domestic electrical progress of recent times, attention cannot be directed too often to the tremendous scope that remains for the sale of electricity which will bring work to the manufacturing interests through orders for more plant, cable, appliances, and installation and other accessories. This, of course, will mean relief to unemployment funds. The industrial situation seems to be gradually improving, judging from the latest statistics issued by the Ministry of Labour, from which it appeared that on August 21st there were 57,000 more insured persons at work than a month before, and 648,000 more than a year before. The industries showing improvement including iron and steel manufacture, engineering, shipbuilding and ship repairing, electrical apparatus manufacture, the woollen and hosiery industries, and the shipping and hotel services. This should encourage us to get on with our job more energetically.

A Commercial Electrical Association

In view of the present state of affairs I have been studying with more than ordinary interest the issues of the ELECTRICAL REVIEW for the latter part of 1931 and the early part of 1932. Your editorial columns gave an impetus to the industry then by your advocacy of a National Canvass. The suggestion brought an enthusiastic response, and, incidentally, raised the question of the need for a Commercial Electrical Association. Is not the present time most opportune for all concerned to endeavour to create such an association, particularly bearing in mind inevitable future developments?

In the REVIEW of February 19th, 1932, in your Correspondence columns, an appeal for a Commercial Electrical Association was published. The objects as then stated briefly in outline were: "To organise the whole of the professional, administrative and commercial interests relating to the electrical industry. To safeguard, maintain and improve the status of the members. To give to the Legislature, Government Departments and others, facilities for conferring with, and ascertaining the views of persons engaged or interested in the industry. To consider all Bills introduced into, and to take cognisance of all questions raised in Parliament affecting the interests of the industry. To introduce such Parliamentary or other measures from time to time as may be deemed advisable for promoting and securing the interests of the industry. To provide and maintain educational facilities, hold examinations and grant diplomas."

In my opinion an association constituted on these lines would not clash with any other organisation. Brig.-Gen. R. F. Legge, in an article on "Electricity is Good for You!" (ELEC. REV., January 8th, 1932) suggested a co-operative scheme in which the Central Electricity Board should throw in its lot with the E.D.A. As we all know this proposal has now matured. Every credit is due to the splendid work of the E.D.A. in the past, carried out under adverse conditions, but in its reconstituted form and with increased revenue, we look forward to increased activities. The leader in your issue of September 1st, "The Perennial Problem," and Mr. Munro's article on "Engineers and Management" show that the engineer can only continue to exist so long as his skill is translated into £ s. d. by those whose ability lies in the direction of financing, selling and managing.

But I do not think that controversy of this nature will lead us anywhere. Both the technical and the commercial man have their value to the industry according to their ability in their own particular line of activities. What we require more than ever is a good team spirit; let us fight altogether for the common cause. Adjourn the "case" of "Engineer *v.* Commercial" *sine die*, or, better still, permanently bury it.

The Position in Canada

CONDITIONS in the early months of 1933 indicate that the bottom of the depression has been reached so far as Canada is concerned, and an improvement is anticipated, says Mr. F. W. Field, H.M. Senior Trade Commissioner in Canada and Newfoundland, in a Department of Overseas Trade report on economic conditions in the Dominion (Stationery Office 5s.). Like other countries, Canada has endeavoured to handle a depressing situation with courage in the hope that its efforts, united with those of others, will return the world to prosperity.

The Canadian dollar has been allowed to find its own level during the past year, but fluctuating exchanges have caused trading difficulties. Business men engaged both in manufacturing and importing are devoting much of their time to meeting successfully the rapid and continuously changing conditions.

Two of the factors that appear likely to pull the Dominion out of the world-wide depression are, first, the nation's own efforts, and opinion seems to be unanimous that these must be of a drastic character; and, secondly, the general improvement in world conditions which naturally find sharp reflection in Canada's trade, industry and business. In a general way, the Dominion's rise to and fall from good times has lagged in point of time behind that of other leading countries. In addition, its power of resistance to depression is stronger than that of many other nations.

Statistics obtained from 149 establishments, comprising practically all the important manufacturers in the Canadian electrical apparatus and supplies industry, show that in 1930 (the latest year for which information is available) a total capital of $102,979,896 was invested, the gross and net value of the products being, respectively, $104,577,790 and $61,466,161; the cost of materials was $43,111,629. Employés numbered 20,568, and $26,260,004 was paid in salaries and wages.

British Manufacturers Hold Their Own

Although the actual turnover was considerably below that of the three years preceding, United Kingdom electrical firms generally held their own last year and improved their position. The British Electric Products Co. was established in April last and took over the Canadian interests of the Lancashire Dynamo and Crypto Co. of Canada, Ltd., the Harland Engineering Co. of Canada, Ltd., Crompton Parkinson (Canada), Ltd., and Bruce Peebles (Canada), Ltd. It is believed that benefit will accrue not only to the four companies concerned but to the trade as a whole, including purchasers of equipment because, with reduced overhead expenses, the companies will be in a better position to quote keener prices and to give the service demanded. The electrical equipment industry appears to be adequately covered by the firms now doing business in Canada.

The programme of water-power development that is approaching completion had its origin three or four years ago before the world-wide economic disturbances brought an almost universal arrest of industrial expansion. Up to the end of 1929 the demand for electrical energy in Canada kept pace with the increase in installed capacity. Subsequently depressed industrial conditions resulted in a decreased demand which reached its lowest point in the middle of 1931. More stable conditions now appear to have been established, since the figures for 1932 indicate that electrical energy produced for use in Canada was practically the same as for 1931.

Decrease in Exported Power

The reduction in the total production of electricity during the past year was almost entirely due to the loss of production for export, which was about forty-six per cent. less than for 1931, according to information furnished by the Director of the Canadian Government's Water Power Bureau. So far as the situation within Canada is concerned, statistical records indicate that the production of electricity is again increasing. What the rate of increase may be in the immediate future is difficult to forecast, but any definite improvement in industrial operations should be rapidly reflected in electricity production. There is a steady increase in the energy supplied for domestic use.

The total hydro-electric installation of the Dominion averages 670 h.p. per thousand of population, a figure which places Canada in a leading position among the water power using countries of the world.

During 1932 water power development was confined to undertakings already in course of construction at the beginning of the year, and no new works of any magnitude were initiated. Turbines actually installed and brought into operation resulted in a net addition of 378,923 h.p. to the Dominion's total, bringing it up to 7,045,260 h.p. An estimate places the total known available water power in Canada from all sources at 20,347,400 h.p. for conditions of ordinary minimum flow and 33,617,200 h.p. ordinarily available for six months of the year.

Broadcasting

Provision was made in the 1932 session of Parliament for the creation of a national broadcasting system, and the Canadian Radio Broadcasting Commission was appointed in November last. At the invitation of the Canadian Prime Minister, Major Gladstone Murray, of the British Broadcasting Corporation, paid a visit to Canada in the spring to act for a period in an advisory capacity; his report was published a few weeks ago (see our issue of August 25th, page 265).

The Commission has made a beginning by providing a number of musical programmes each week through existing commercial broadcasting stations, and it plans to make a beginning this year in the provision of better broadcasting facilities by the organisation of two high-power stations in Western Canada, one in Saskatchewan and one in British Columbia.

The radio receiving sets sold in Canada by authorised manufacturers or importers during 1932 numbered 133,454, valued at $6,758,959, factory selling prices. Compared with the figures for 1931, when 286,122 sets were sold for $18,141,347, the data for 1932 showed a decline of 53 per cent. in the number of sets sold and a drop of 63 per cent. in the receipts from sales. During 1932 the number sold followed production very closely. Of the total sales in 1932, Ontario took 39.3 per cent., Quebec 22.9 per cent., British Columbia 9.6 per cent., Manitoba 9.6 per cent., Alberta 6.6 per cent., Saskatchewan 5.4 per cent., Nova Scotia 4.1 per cent., New Brunswick 2.1 per cent, and Prince Edward Island 0.4 per cent. On December 31st, 1932, radio manufacturers and authorised importers reported an inventory of 32,175 sets on hand. This compares with 34,521 and 25,852 at the end of 1931 and 1930 respectively.

State Electrical Trading in Victoria

THE Victorian Electricity Commission has circulated to members of the State Parliament a booklet advancing reasons why members should oppose the proposed Government Bill to suppress the trading activities of the Commission. The booklet contains a report which was sent to the Minister in Charge of Electrical Undertakings in August, 1932. This stated that more than 3,000 electrical public utilities in various parts of the world were already selling domestic electrical appliances and that there was not one undertaking the size of the Commission in English-speaking countries which did not engage in this activity. The problem of all supply authorities to-day, particularly in the domestic field, was not to sell the service but to sell the means of using the service. In the two years before August, 1932, particularly, the Commission had prosecuted more vigorously its sale of appliances, and in the period had secured increased revenue of about £30,000 a year at a cost of £4,000. Faced with serious losses from decreased industrial load, had it not been for this increment of revenue from the sale of appliances the Commission would have had to consider increasing its rates in order to balance its accounts.

In the report it was contended that traders had benefited from the effective widening of the appliance market—a direct result of the "promotional" work of the Commission. The total revenue of the Commission from electricity supply was about £2,500,000 a year, and the total merchandising turnover for 1931-32 was £89,000, or 3.6 per cent. of the total revenue. In 1931-32 a loss of £2,248 was made on merchandising operations, but the appliances sold in the two years before August, 1932, assured an increment to its revenue of £39,000 a year. The net and final cost of the sales efforts to secure this extra revenue was £4,022.

The total amount invested in stock, hire-purchase advances, showroom equipment and other capital expenditure for merchandising purposes as at June 30th, 1932, was £82,457. Referring to criticisms that the Commission's trading was crushing private enterprise, the report stated that experience in England and other countries indicated that far from the private trader being forced out of business as a result of merchandising by electrical undertakings he was, on the contrary, a more active and efficient merchant as a result.

In a covering letter to members of Parliament, signed by the chairman of the Commission (Mr. F. W. Clements) and the three commissioners—Sir Thomas Lyle, Sir Robert Gibson, and Mr. D. J. McClelland—it is stated that in that section of Melbourne served by the Commission the present average annual consumption per domestic consumer is less than 400 kWh, whereas in other cities of the world where electricity has reached a higher point of development it is 1,200 kWh and in some instances exceeds 3,000 kWh.

New Books

Neon Tube Practice, by W. L. Schallreuter. Pp. 132, illus. London: Blandford Press, Ltd. Price 10s. 6d.

The tremendous growth of the neon sign industry within the past few years and the undoubted public interest in this form of advertising, makes the appearance of a book on the subject an occasion of special interest. A considerable amount of work of a scientific and technical nature bearing more or less directly on neon signs has already been published. Most of these publications are not readily available, nor are they suitable for the non-scientific reader. The book under review, which is a popularised account of a subject essentially highly technical should prove of considerable interest to those readers who have no knowledge whatever of neon signs. Manufacturers and others acquainted with the technical side of the neon sign industry will find little in the book which is new to them, and it is difficult to agree with the publishers' claim that the book will become the standard reference work on the subject.

The book contains much that is either scientifically inaccurate or so vague as to be incomprehensible. In the latter connection the section on "Wriggle Tubes" in the appendix is an example. In Chapter I the ionisation potential of a gas is confused with the striking potential of a discharge tube. The indiscriminate use of the term pressure for voltage or potential throughout the book is to be deprecated especially, as in the present case, where confusion with gas pressure is likely to arise.

In view of the importance of the question of wireless interference by neon installations it seems a pity that a much fuller treatment of this subject is not given. The same remarks apply to the section on power factor. Practically no mention is made of the very important application of cold cathode tubes in modern aerodromes. Almost everyone who has visited Croydon Aerodrome at night must have seen the neon beacon and landing-line in use. These consist of standard cold cathode tubes operated at about ½ A, and *not* hot cathode tubes running at from 10 to 25 A. The section on hot cathode tubes is curiously inadequate in view of the ever-increasing importance of this branch of the neon industry.

The book contains several mistakes of the kind which are perhaps excusable when it is realised that the author is not writing in his native language. The use of the word "invisible" for "visible" on page 77 is unfortunate. There is no index and no references to the many published papers and articles dealing with the more technical side of the subject. The illustrations of typical neon installations are excellent, however, and the book is very well produced.

Télévision et Transmission des Images. By RENÉ MESNY. Pp. 216; figs. 97. Paris: Armand Colin. Price: 10.50 fr.

This small volume, which is No. 162 in the "Collection Armand Colin," fully maintains the reputation of that well-known series. The author is eminently qualified to write on the subject of television and the transmission of images, and he has succeeded to a remarkable degree in combining simplicity of treatment with scientific accuracy. Without going much, if at all, above the head of any reader who is familiar with the general technology of radio communication, the presentation of theory, principles and practice is sufficiently detailed to meet the requirements of serious students of the subject, particularly if they follow up the admirably selected bibliographical references in the text. No attempt is made to minimise the technical difficulties of television and, wisely in our opinion, the author offers no suggestions for a home-made or amateur television set. In the present state of knowledge, television and the transmission of pictures demand a complexity and quality of equipment which are beyond the scope of the average amateur.

The author concentrates on explanations of the principles employed, and on the theory and action of the various types of apparatus hitherto devised. In particular, he renders valuable service by indicating, as clearly as possible, the limitations imposed by the nature of radio transmission itself, and by physiological and psychological factors. It can hardly be doubted that complete success will ultimately be attained in television in the fullest sense of the term, and the realisation of this aim will be materially hastened by clear analyses of the laws and principles involved. The book now before us presents such an analysis. Throughout, circuit diagrams and operating characteristics are included and, wherever available, formulæ and equations are given for the quantitative treatment of problems. While the book makes evident the complexity of many of the problems awaiting solution, it affords an equal measure of satisfaction at the immense amount of knowledge and experience already acquired in a field of research which will virtually complete the annihilation of distance.

Elements of Engineering Acoustics. By L. E. C. HUGHES Pp. 159: figs. 32. London: Ernest Benn. Price 8s. 6d.

No one will wish to dispute the importance of Mr. Hughes's new book on the subject of acoustics. His views are all the more interesting because practically all the research literature on this subject comes from the United States, where large industrial organisations interested in this subject employ groups of highly paid workers who collaborate in analysing in book or article form the results which they obtain. Even the work of universities has been sponsored by industrial bodies so that new thought has been guided into commercial channels with the minimum of friction.

Mr. Hughes's book, on the other hand, shows itself to be the work of an individualist who scorns accepted ideas, and it is written on entirely different lines from those on which American ideas are set. We doubt very much if Mr. Hughes himself realises the extent to which he has cut across the accepted "sound track" with his "views," because he states in the preface that "no claim is made for the ideas herein collected and formulated except for the conception that the æsthetic volume of sound depends on its acoustic ratio." This statement certainly covers the most dangerous ground on which Mr. Hughes has trodden, but there is not a page that is not exhilarating.

We hope that this break-away will lead others to follow Mr. Hughes's example, for so long as we copy we shall not lead. The book should make its effect felt in this country, where the impression is prevalent that equipment cannot be any good unless it comes from America. As soon as we have dispelled this inferiority complex the industry will lead in sound-producing equipment as it is beginning to do in film direction to-day.

Ray Controlled Mechanism. By Major RAYMOND PHILLIPS. Pp. 96; figs. 42. London: Percival Marshall & Co., Ltd. Price: 2s. 6d.

Many electrical engineers a decade or so ago went to a music hall to see a demonstration of the wireless-controlled airship of Major Raymond Phillips, and a very good "show" he gave, too. It was in the days before the valve, and the old coherer and wireless spark transmitter seemed in his hands to work with extraordinary reliability. In this book Major Phillips tells his readers how to control model airships, trains, and boats by much the same methods, and gives us the method of construction of his coherer, which is simplicity itself. The coherer is, in his opinion, more suitable for the hard knocks of the model engineer, and, being more or less a means of providing a short circuit when excited by a wireless wave, it certainly admits of the use of relays suitable for moderately heavy currents without the need for amplification.

The book is essentially one for those who enjoy experimenting with models, but it contains much that should be read by those engaged in the design of advertising signs and ray-controlled industrial apparatus.

"Automobile Engineering." Vol. VII. Ignition, Starting, and Lighting. By MAJOR H. GARRARD. Edited by H. KERR THOMAS. London: Sir Isaac Pitman & Sons. Price: 2s. 6d.

This volume completes the series and is the only one which deals with electrical apparatus. Viewed as a whole the installation of the modern motor car is intricate and complicated, but the subject has been presented dissected into its elements, and can easily be followed by the motorist with little electrical knowledge. The whole of the electrical equipment is dealt with, and the volume forms a complete textbook on the electrical installation, by the help of which the initial layout of the details can be made as well as the whole adjusted and maintained. The quality of the production is good, and there are a large number of very clear drawings.

Rayleigh's Principle and its Application to Engineering. By G. TEMPLE and W. G. BICKLEY. Pp. 156. Oxford University Press. Price 14s.

The authors discuss the theory and practice of the energy method for the approximate determination of critical speeds and loads. Rayleigh's principle is useful for the rapid calculation of approximate values, but the results are always slightly in excess of the true values. In this book his method is developed mathematically so as to enable both upper and lower estimates of true values to be provided. Critical loads and frequencies can thus be determined within known degrees of approximation.

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Shorter Notices

Electrical Transmission and Distribution," by E. T. A Rapson (12s. 6d.). London: Oxford Univerity Press.

"Advanced Electrical Measurements," by W. R. Smythe and W. C. Michels (15s.); "Electrical Circuits and Machinery," by J. H. Morecroft and F. W. Hehre, vol. I: Continuous Currents (25s.); "Electron Tubes," by John H. Morecroft (28s.). London: Messrs. Chapman & Hall.

"Works Management Education" (7s. 6d.). London: Sir Isaac Pitman & Sons.

"Text-book on Heat," by A. W. Barton (7s. 6d.) London: Longmans, Green & Co.

"The Modern Diesel" (3s. 6d.). London: Iliffe & Sons, Ltd.

"Analytic and Vector Mechanics," by H. W. Edwards (24s.); "Direct and Alternating Currents," by E. A. Loew (27s.). London: McGraw Hill Publishing Co.

"An Introduction to Aerodynamics," by R. Poole (2s.). London: The Draughtsman Publishing Co.

"The Wireless Constructor's Encyclopædia," by F. T. Clamm (5s.); "Dictionary of Wireless Terms," by Ralph Stranger (2s. 6d.); "Elements of Wireless," by Ralph Stranger (3s. 6d.). London: Geo. Newnes.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Tungsten Lamp Patents

The German patents for the tungsten lamp filament will expire in that country on October 6th, and lamp makers there are now engaged in considering the position, especially in view of the possibility of the establishment of new lamp works and the introduction of Japanese competition in Germany, which has hitherto been prevented by the operation of these patents. The lapse of the patents is not expected to have any influence on the activity of the Continental Glow Lamp Cartel of Geneva, of which the German lamp works are members, as the cartel, it is anticipated, will take measures for protecting the different markets against Japanese competition. Negotiations are now proceeding among the leading lamp makers in Germany with the object of forming a closer association of interests than at present exists. It is hoped to be able to prevent the advent of fresh competition, and to include in a new and stronger association the many small lamp factories which produce special kinds of lamps. It is also quite possible that an application may be made for a prolongation of the patents for the tungsten lamp filament. Such an application, it is urged, would be specially in the interest of the smaller lamp factories, particularly as the Japanese have very considerably developed this branch.

The Marking of Imported Wireless Valves

Following its inquiry held some weeks ago, the Board of Trade Standing Committee (General Merchandise) recommends that imported wireless valves and rectifying valves should bear an indication of origin and that the mark should be applied in a contrasting colour to the bulb or cap of each valve, as well as printed or stamped on the container in which the valve is exposed for sale or sold. The Committee states that it has carefully considered the request of the applicants (the British Radio Valve Manufacturers' Association) for an Importation Order, but does not think a sufficient case has been made out for it. The report of the Committee (Comd. 4,410) is obtainable from H.M. Stationery Office, price 2d.

Cryselco Lamp Sales Aids

We have received from Cryselco, Ltd., their new catalogue and price list of electric lamps, together with specimens of

A new Cryselco showcard

their new season's showcards. As in previous years, the central feature of the showcards is "Colonel Cris. Elco," and in the illustration accompanying this note he is seen holding an opal lamp with an evening sky of deep blue as a background. Provision is made at the back of the card for the insertion of lamps, and when illuminated the effect is very striking; this card is produced in two sizes. The other specimen shows the "Colonel" standing between an opal and a pearl lamp.

The Scottish Radio Exhibition

After a very successful eight days in the Kelvin Hall, Glasgow, the Scottish Radio Exhibition closed down on Saturday last. The attendance was well maintained, the total number of visitors being in the neighbourhood of 200,000. There is good reason to believe that excellent business was done, and one high-tension battery manufacturer claims to have booked orders for £50,000 in one day, while the total sales are said to have reached about £1,500,000. The Radio Manufacturers' Association, which organised the exhibition, is apparently well satisfied, for at a luncheon given in honour of the Lord Provost, Mr. A. B. Swan, the chairman of the Association, Mr. W. W. Burnham, said that the attendance at the exhibition had been very satisfactory and they intended to organise another exhibition next year.

There was a certain amount of duplication of sets exhibited, since many of the stands were leased by wholesale distributors who showed specimens of all the receivers they sell. The manufacturing firms made an excellent impression and the Scottish public has no reason to complain of lack of knowledge of recent developments. During the week communication was established from the exhibition with the *Empress of Britain*, and her captain spoke from a point some 900 miles out from Southampton. A model of Broadcasting House attracted large crowds.

Four G.E.C. 1,250-h.p., 6,600-V, 3-ph., 50-cycle vertical spindle synchronous induction motors at Witton Station, ready for despatch to Southampton, for driving pumping equipment at the new graving dock. The stators are seen in the foreground and the rotors in the rear. The total load is about 100 tons

Irish Free State Electrical Imports

A slightly quieter tone prevailed in the electrical trade in the Irish Free State during July last, the imports of electrical machinery, fittings, and cognate apparatus attaining a value of £42,397, as compared with £58,497 in July, 1932. The appended table gives details of the aggregate imports during the first seven months of the current year, and shows an increase of £23,125, or just over 5 per cent. over the same period a year ago.

	January–July. 1932.	1933.
Electrical machinery	118,395	130,445
Electric wires and cables	62,510	37,621
Wireless sets and parts	99,637	107,836
Electric lighting accessories, fittings and parts	29,946	22,695
Other electrical goods	80,331	120,720
Copper wire	6,218	845
Totals	£397,037	£420,162

Kettering Radio Exhibition

The three-day radio exhibition promoted by the Kettering Radio and Physical Society was opened at the Central Hall, Kettering, yesterday (Thursday) by Coun. H. Hodge, J.P., chairman of the Kettering Urban District Council, with Mr. Alan Timpson, President of the Radio Society, in the chair. The exhibition, which is confined to local dealers, is the first to be held in the town, and it is hoped to make it an annual event. Practically every retailer in the town has a stand, and the new season's models, direct from Olympia, are on show. Exhibits on the Radio and Physical Society's own stand include a 50-watt crystal controlled short-wave transmitter, short wave receiver, 5-metre transmitter, and receiver, picture receiving apparatus, new type automatic record changer patented by a member of the Society, cathode-ray oscillograph, stroboscopic apparatus, harmonograph, quartz crystals and high-speed automatic morse printers. The Society's literature stand shows a complete range of technical publications by leading radio authorities in this country.

Television demonstrations and ultra-short-wave demonstrations are features of the show, while an annexe is used for free cinema exhibitions where instructive wireless films are shown, together with films depicting manufacturing processes. A broadcasting competition for announcers, vocalists, and comedians takes place daily in a novel studio, the competitors' efforts being broadcast in the main hall. Each stand is provided with a point for the supply of music fed from a central

amplifier provided by Mr. Paul Taylor, radio programmes being given, supplemented by records. Microphones fed the opening speeches through this system. Sound-proof demonstration rooms are used by some of the exhibitors for demonstration purposes, while each exhibitor has a period allotted each day when he may audibly demonstrate sets on his stand, the central amplifier being shut off. Mr. John Clarricoats (G6CL), Empire Secretary of the Incorporated Radio Society of Great Britain, is staying in the town for the duration of the exhibition, and will give a brief address on Friday and Saturday.

Electrical interference is acute in the vicinity of the exhibition hall, and, following a petition signed by all the exhibitors, Post Office engineers have been busily engaged for over a week in order to reduce the interference so that demonstrations at the show will not be interfered with. In some cases special silencing apparatus has been installed for the duration of the exhibition. A loud speaker publicity van is touring the streets to advertise the effort.

Decorative steel tubing is used to good effect in this neat window display

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price, September 13th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£3	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3½d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. less 6 per cent.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ,,	1/2 to 29	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£195	—
Grade II ... ... ,,	£134	—
Grade III ... ... ,,	£66	—
c Brass (rolled metal 2" to 12" basis) per lb.	7¼d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	9¼d. to 9½d.	—
c ,, Wire, basis ... ... ,,	7¾d.	¼d. dec.
c Copper Tubes (solid drawn) ... ,,	10¼d.	—
g ,, Bars (best selected)... ... per ton	£66	—
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£42	10s. dec.
d ,, ,, Sheets ... ,,	£64	—
d ,, ,, Wire Rods ... ,,	£47	10s. dec.
d ,, ,, H.C. Wire ... per lb.	7¼d.	⅛ dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4¾d.	¼d. dec.
i Iron, Pig (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire, galv. No. 1, P.O. qual. ,,	£20	—
g Lead, English Pig ... ... ,,	£13 5s.	10s. dec.
g Mercury ... ... per bot.	£9 to £9 5s.	5/- to 12/6 inc.
e Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	1/0½d.	—
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8¼d.	⅛ dec.
r Steel, magnet, in bars ... ... ,,	7¼d.	—
n Tin, Block (English) ... ... per ton	£218 to £220	£2 10s. dec.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/5	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R. Dennis & Co.

The Leipzig Autumn Fair

According to leading exhibitors, buyers, industrialists and traders, the Leipzig Autumn Fair, which closed on August 31st, may be regarded as the turn of the tide in business. In some sections the turnover showed an increase of from thirty to fifty per cent., and over 100,000 visitors attended the Fair, five per cent. of them coming from overseas. The exhibitors numbered 5,833, and of these 318 were from foreign countries. The Leipzig Spring Fair has been fixed for March 4th, 1934, and already extensive concessions in travelling facilities are being arranged for overseas visitors.

Shop Window Tubing

A fortnight ago (ELECTRICAL REVIEW, September 1st, p. 274) we referred to the need for greater variety of design in shop-window lay-outs, and mentioned that expert attention would be of assistance to electrical retailers who desired to make an effective display. We have now received from Tube Products, Ltd., of Oldbury, Birmingham, a number of photographs showing how effectively their "New Process" steel tubing is being used in the windows of well-known stores where so much depends upon pleasing the eye of the purchasing public. An idea of the appearance of such a window in which the tubing forms an important feature in the general scheme may be gained from our illustration. In the process of manufacture the tubing is efficiently welded; it has a smooth surface and is supplied in a wide range of sections. The tubing is light and strong and is concentric and uniform in gauge.

Battery Manufacture in Canada

The Dominion Bureau of Statistics at Ottawa reports that in 1932 a total of twenty-seven Canadian factories producing electric batteries had an output which is valued at $4,239,467, as compared with $5,007,620 in 1931. These plants employed a monthly average of 994 persons earning a total of $1,203,803. Storage batteries were made in twenty-three establishments, the production being worth $2,521,557, whilst four plants turned out dry batteries for radio work, flashlights, etc., valued at $1,592,783.

Trade Announcements

The partners in the firm of Messrs. W. Gunther & Sons having decided for private reasons to retire from business Messrs. Gilbert Gilkes & Gordon, Ltd., have arranged to take over their water power connection.

Messrs. J. M. Stone have opened premises at 12, Castle Street, Bristol, as electrical engineers.

Messrs. Thomas & Owen, electrical contractors and wireless dealers, of Merthyr Tydfil, are transferring their business from Post Office Lane to 74a, Pontmorlais.

Social Event

The Reyrolle Amateur Mixed Swimming Club held its fourth annual gala on Wednesday last week. A large number of interesting events were on the programme, including a demonstration by a team of experts from the Royal Life Saving Society. The majority of the competitors were employés of

Mrs. L. E. Mold presenting the first prize and the Mrs. H. W. Miller Challenge Cup to Miss D. Gibson at the Reyrolle Swimming Gala

Messrs. A. Reyrolle & Co., Ltd., and a large audience of relations and friends attended the gala. Many of the officials of the firm were also present and a very enjoyable evening was spent. Mr. L. E. Mold presided and the prizes were presented by Mrs. Mold.

Japanese Lamp Industry

The Japanese Government, in conjunction with the trade guilds, is now adopting measures for the control of export products and prices, partly with the object of attempting to remove the reproach of dumping, which is keenly resented in

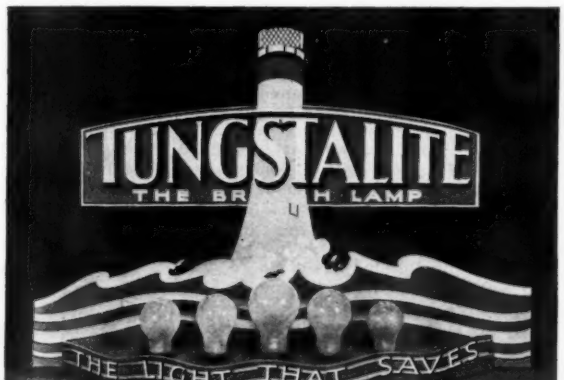
Japanese industrial circles. The first step has already been taken in this direction in the porcelain industry, and the electric lamp industry is now being dealt with in a similar manner. In this connection the Société d'Etudes Economiques of Paris points out that the principal centre of the production and export of electric lamps is Tokyo, where the Tokyo Export Bulb Association has a membership of twenty-four firms, while the Tokyo Electric Bulb Association comprises the five large manufacturing works of Toden, Teikoku, Metro, Osaki and Ebisu. Now the Prefecture of Tokyo, with the assistance of the Minister of Commerce, is engaged in combining all these makers into a single federation with the object of exercising strict control over the quality and prices of the lamps. The Société d'Etudes further states that during the first four months of 1933 the exports of Japanese electric lamps amounted to 87,000,000, or an increase of 22,000,000 over the corresponding period of 1932; owing, however, to the protective measures adopted by various countries against Japanese lamps, the exports of 25,700,000 lamps in February declined to 14,000,000 in April. The value of the Japanese lamp exports is stated to have increased from 7,784,000 yen in 1931 to 12,753,000 yen in 1932.

Stewarts & Lloyds' Corby Steelworks

Excellent progress is being made with the mile-long £3,300,000 Bessemer steelworks for Messrs. Stewarts & Lloyds, Ltd., at Corby, Northants. The order for the Bessemer steelmaking plant has been placed with the Pearson & Knowles Coal & Iron Co., and work is proceeding rapidly on the coke ovens, the by-products plant and the coal washery. At the old Corby furnaces the old No. 1 stove has been demolished, preparatory to the erection of a newer and larger one, the furnace being relined. The large area of land owned by Messrs. Stewarts & Lloyds off the Rockingham Road will be the site of a large housing estate, which will form a continuation of the present village. A feature of the estate will be the use wherever possible of Stewarts & Lloyds' steel and wrought iron tubes in the construction of the houses.

A New Tungstalite Showcard

The new lamp showcard produced by Tungstalite, Ltd., is in three colours, and, as will be seen from the accompanying illustration, a lighthouse has been chosen for the design with the appropriate slogan, "The Light that Saves."



A Tungstalite lamp showcard

Provision is made at the bottom of the showcard for fixing one of each of the company's pearl lamps, ranging from 15 W to 100 W, while a lamp can be placed at the top of the tower giving the impression that the lighthouse is illuminated.

Recent Contracts

Messrs. Ferranti, Ltd., have just received an order in the face of world-wide competition for what is believed to be the first large British-made transformer to be installed in Finland. It is a 3-phase unit of 12,000-kVA capacity for operation at 47,000 V, with on-load tap-changing gear, and it will be used in connection with the transmission of power from the Imatra hydro-electric scheme to the Warkhaus paper pulp factories. Large transformers hitherto installed in Finland have been of German and Swedish manufacture.

The recent launching of the *s.s. Pass of Balmaha* at the Blythswood Shipbuilding Co.'s yard for the Bulk Oil Steamship Co. has attracted great interest in all quarters. The new ship, together with the *Pass of Leny*, *Pass of Ballater* and *Pass of Melfort*, form a first-class modern fleet of tankers operating solely in home and near Continental waters. The Bulk Oil Steamship Co. has now instructed Messrs. Siemens Brothers & Co., Ltd., who conduct the wireless service, to install one of their latest direction finders on each ship.

Cooking Demonstration at Cheadle

Cheadle and Gatley Electricity Department is to give a series of electric cooking demonstrations and lectures on electric water heating, the first of which will take place in Cheadle Hulme during the week commencing September 25th.

Overseas Electrical Trade in August

Little change as compared with August, 1932, is recorded in the value of electrical exports during last month, the total declining slightly from £708,823 to £699,964; of this sum electrical machinery accounted for £156,288, as compared with £270,516. Imports fell from £279,836 to £255,294, purchases of electrical machinery amounting to £20,056, as against £36,794. Our usual monthly table giving a detailed analysis of the electrical trade in August will appear in our next issue.

A neat Kye lamp window display centre piece

Ever Ready Window Display Competition

The window display competition organised by the Ever Ready Co. (Great Britain), Ltd., will be held this year from October 2nd to 14th, and photographs of displays entered must reach the company's offices at Hercules Place, Holloway, N.7, by October 10th. The hundred cash prizes offered include four special £30 prizes for the best displays regardless of window size or district, thirty-two prizes of £20, and sixty-four £5 consolation prizes. Full particulars regarding the conditions of the competition are now available from the company on application.

New Carlisle Showrooms

Carlisle Corporation Electricity Committee has purchased a site in Castle Street for new electricity showrooms, offices, and a sub-station.

Catalogues and Lists

G. W. B. Electric Furnaces, Ltd., Elecfurn Works, North Road, Holloway, N.7.—An illustrated leaflet dealing with Wild-Barfield and Gibbons-Wild-Barfield box-type electric furnaces with "Heavy-Hairpin" elements.

Electrical Appliances, Ltd., Northend Road, Wembley Park. —A folder illustrating and describing "Inventum" electric fires.

John Dugdill & Co., Ltd., Hazel Grove, near Stockport.—A catalogue of movable, focusing, self-sustaining lighting fittings.

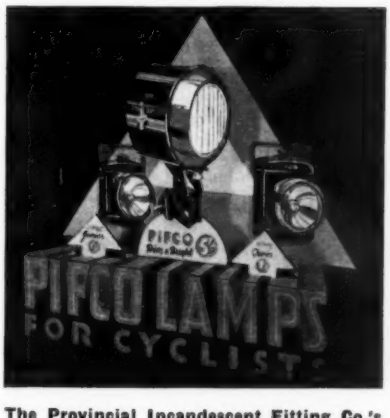
Heyes & Co., Ltd., Water-Heyes Electrical Works, Wigan. —The September "Wigan Review" containing particulars of the "Wigan" battery exploders.

Wild-Barfield Electric Furnaces, Ltd., Elecfurn Works, North Road, Holloway, N.7.—A leaflet dealing with the "TRT" toolroom tempering equipment which the company has just introduced. Also particulars of "Eternite" case-hardening compound.

Electro-Surplus, Ltd., 9, North Saint David Street, Edinburgh.—A circular referring to the company's reconditioning service.

W. T. Glover & Co., Ltd., Trafford Park, Manchester.—A brochure illustrating and describing the company's house wiring systems.

Birmingham Electric Furnaces, Ltd., Birlec Works, Tyburn Road, Erdington, Birmingham.—Leaflet No. JFC.33 describing a new small vertical tempering furnace.



The Provincial Incandescent Fitting Co.'s new cycle lamp showcard

A. Vandam & Co. (1933), Ltd., Caxton House, Westminster, S.W.1. — Leaflets describing the "Invicta" electric hairdryers and time switches recently placed on the market.

Provincial Incandescent Fittings Co., Ltd., Pifco House, High Street, Manchester.—The company's 116-page general catalogue for 1934, with sections devoted to domestic electrical appliances and accessories, radio apparatus, flashlights, &c. "Pifco" flashlights are now sent out in coloured cartons admirably suitable for display purposes.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. —Leaflet No. X6587 giving details of a new range of industrial iron-clad circuit-breakers embodying the "line contact" principle.

Petters, Ltd., Westland Works, Yeovil.—An announce-

ment regarding a revision in sizes and powers of atomic Diesel engines and semi-Diesel engines.

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.—Publications Nos. H.C. 913 and 917, giving illustrations, prices, and particulars of the new season's "Ediswan" fires.

Falkirk Iron Co., Ltd., Falkirk.—Lists Nos. 691, 692 and 693 dealing respectively with "Falco" electric fires (a) of the portable radiant type, (b) of the imitation fuel type, and (c) of the wall or fireplace type.

Siemens & General Electric Railway Signal Co., Ltd., Central House, Kingsway, W.C.2.—A pamphlet (No. B.2) describing a new type of S.G.E. lever lock and circuit controller.

Feed Water Specialists Co., St. Paul's Square, Liverpool.—Technical publication No. 61 illustrating various examples of the company's service.

Shaw, Son & Greenhalgh, Ltd., Albert Works, Huddersfield.—A leaflet on high-pressure valves and boiler mountings.

Rowlands Electrical Accessories, Ltd., Hockley Hill, Birmingham.—An illustrated catalogue dealing with new "R.E.A.L." electric heaters and industrial lighting equipment.

Ateliers de Constructions Electriques de Charleroi, 56, Victoria Street, S.W.1.—The September stock list of motors, generators, pumps, &c.

Company Liquidations

H. Hebblethwaite (Leeds), Ltd., wireless factors, 6, Park Place, Leeds.—The statutory meeting of creditors was held on September 5th at the offices of Sir Charles H. Wilson & Co., 7, Green Street, Leeds, when the statement of affairs showed liabilities of £1,512, of which £1,504 was due to unsecured creditors and the balance to a partly secured creditor. The assets totalled £232, and after allowing £11 for preferential claims, the net assets were £221, leaving a deficiency of £1,292. The issued capital amounted to £100, making a total deficiency of £1,392. It was stated that a meeting of the shareholders had already been held, and Mr. J. L. Kitching, of Messrs. Charles H. Wilson & Co., had been nominated as liquidator. The creditors passed a resolution confirming that appointment, and elected a committee of inspection, consisting of the representatives of Messrs. Hardman & Co., Ltd., Mr. T. A. Stoker and Mr. C. H. Baker. The following are the principal creditors:—Britannia Batteries, Ltd., £93; Hardman & Co., Ltd., £729; E. Hodgson, £53; Oldham & Son, Ltd., £51; H. C. Rawson, Ltd., £53; Standard Telephones & Cables, Ltd., £67; Victoria Radio Co., Ltd., £70.

Bond Wholesale Electrical Co., Ltd.—Particulars of claims by October 5th to the liquidator, Mr. P. T. Muggison, Corridor Chambers, Market Place, Leicester. Meeting October 12th at the above address to receive an account of the winding-up by the liquidator.

Underground Electric Railways Co. of London, Ltd.—Particulars of claims by September 30th to Mr. J. C. Mitchell, secretary to the liquidator, 55, Broadway, Westminster, S.W.

Perrins, Ltd.—Winding up voluntarily. Liquidator, Mr. H. G. Walton, 50, Cannon Street, E.C.

Bankruptcy Proceedings

C. E. Moore (trading as C. E. Moore & Co.), 35, High Street, St. Neots, Hunts, wireless engineer.—The public examination was held recently at the Law Courts, Peterborough. According to the statement of affairs, there were liabilities amounting to £2,731, of which £1,696 was expected to rank for dividend, against assets of £647, thus leaving a deficiency of £1,049. Debtor stated in 1925 he registered a business C. E. Moore & Co., radio engineers. He did fairly well up to 1930. He explained that in 1931 a relay wireless system was installed in the neighbourhood by a competitor. The failure was attributed to trade depression, competition, and illness. The examination was adjourned.

B. M. Cowper and **L. J. White** (trading as Mac's Radio), electrical engineers and wireless dealers, 497, Bristol Road, Bournbrook, Birmingham.—The first meeting of creditors was held on September 6th at the Official Receiver's Office, 159, Great Charles Street, Birmingham, when the statement of affairs showed liabilities of £631 with assets of £212, leaving a deficiency of £419. The position was attributed to insufficient capital and bad trade. The matter was left in the hands of the Official Receiver as trustee.

J. Flint, 18, Summerhill Street, Birmingham, trading as a partner in the firm of Imperial Radio and Cabinet Co., wireless dealers.—The public examination was held on September 6th at the Court House, Birmingham, when the statement of affairs showed liabilities of £1,879 and assets of £431, leaving a deficiency of £1,448. Debtor said he would be able to pay 20s. in the £ if a counter claim of his was recognised. The examination was adjourned.

D. Boulton, radio and electrical engineer, Old Town Avenue, Plymouth, Devonshire.—The adjourned public examination was continued recently at the Western Law Courts, Guildhall, Plymouth, and after further questions had been asked was concluded.

A. Roberts (Castle Radio Manufacturing Co.), formerly carrying on business at 161, Westminster Bridge Road, S.E.—Supplemental dividend of 3s. in the £, payable September 18th at 150, Southampton Row, W.C.

G. Wiseman, radio dealer, 317 and 322, Walworth Road, S.E.—Receiving order made August 31st on a creditor's petition. First meeting September 13th; public examination November 21st, both at Bankruptcy Buildings, Carey Street, W.C.

J. H. McBean (H.W.D. Battery Co.), electrical engineer, 29, Bradford Road, Batley Carr.—Application for discharge to be heard on October 17th at the County Court, Dewsbury.

J. C. A. Willey, wireless engineer, 12, Fernhill Road, Cowley, and 47 and 49, Cowley Road, Oxford.—Receiving order made September 5th on debtor's own petition.

R. S. Wright, wireless dealer, 33, Broomfield Road, Coventry.—Receiving order made September 6th on debtor's own petition.

Dissolution of Partnership

Broall Electrical Co., electrical engineers, Woodridings Works, Hatch End, Middlesex.—Messrs. C. F. Croall and C. T. Brookfield have dissolved partnership. Mr. Croall will attend to debts and carry on the business.

Electricity Supply

Lighting, Domestic, Power

Accrington.—NEW MAINS.—The Electricity Committee is to lay a main to Walkden Fold (£585) and reconstruct mains in the Higher Antley area (£462).

SUB-STATION EQUIPMENT.—Sanction has been received to a loan of £6,000 for sub-station equipment.

BOILER HOUSE ALTERATIONS.—The flues at the boiler house are to be altered and new fans, motors, &c., installed at a cost of £1,500.

Acton.—POPULARITY OF ELECTRIC COOKING.—When the Acton Council requested the Metropolitan Electric Supply Co., Ltd., to furnish a supply of electricity to the tenants of the East Acton Housing Estate, the company stipulated that the houses should be wired for power, as it was anticipated that many of the residents would want to cook by electricity. At first the Council was reluctant to accede to the request, but now the company's foresight is much appreciated, as over one-third of the tenants proposes to adopt electric cooking. To facilitate inquiries, and to provide cooking demonstrations within easy reach of the residents, the company has opened a temporary showroom near the estate, and this has proved highly acceptable to the prospective consumers. The company has also introduced a travelling showroom, which visits various new estates with exhibits of modern electrical appliances.

Airdrie (Lanarkshire).—FUTURE OF UNDERTAKING.—At a recent meeting of the Lighting Committee letters were read from the agents of the Clyde Valley Electrical Power Co. intimating that the company was negotiating an agreement with Coatbridge Town Council with a view to the company undertaking to operate the Coatbridge and Airdrie Electric Supply Order. Negotiations had been opened informally with the Coatbridge and Airdrie Electric Supply Co. as to the amount payable by the Town Council to the company for the undertaking. In the course of these latter negotiations it had been suggested that the company should also take over the Airdrie Order. The company, however, did not desire to embark on any discussion in regard to supply to Airdrie unless with the concurrence of the Town Council, and the company desired to be informed whether such a proposal would appeal to the Council. An informal meeting to discuss the matter was suggested, and the Committee authorised the town clerk to have such a meeting with the agents and to report.

Ayrshire.—PURCHASE OF UNDERTAKING.—It is reported that negotiations have been resumed for the purchase of the Ayrshire Electricity Board's undertaking by the Scottish Board Securities Corporation, a limited concern of Messrs. Balfour, Beattie & Co. An effort to purchase the Ayrshire electricity undertaking was made last year, but was rejected owing to opposition among local authorities comprising the Board. The new proposal, it is stated, includes an increased price, and will be considered by the Board at an early meeting.

Birkenhead.—SPECIAL ORDER.—The Corporation has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of supply to include the urban districts of Wirral and Neston, part of the urban districts of Bebington and Ellesmere Port, and part of the rural district of Chester.

Bishop Auckland.—The North- Eastern Electric Supply Co., Ltd., has written to the Rural District Council regarding the Council's decision not to sell the electricity undertaking at Witton-le-Wear. It has been suggested that a representative of the company should interview the Council with a view to considering the supply generally to Witton, North Beechburn, Victoria, Howden Terrace, and Witton-le-Wear.

Bradford.—NEW SUB-STATION.—The Electricity Committee is to erect and equip a sub-station, costing £4,164, near Moore Avenue, Wibsey.

Carlisle.—RURAL DEVELOPMENTS.—Application is being made by the City Council for sanction to borrow £34,200 for the following purposes: E.h.p. mains, £16,000; l.p. mains, £9,500; transformers and switchgear, £4,000; services, £2,700; and meters, £2,000.

MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £2,228.

Chanctonbury (Sussex).—ELECTRIC PUMPING PLANT.—The Rural District Council has received sanction to a loan of £700 for installing electrically driven pumps at the Storrington waterworks.

Clacton.—CHEAPER ELECTRICITY.—The electric lighting charge is to be reduced from 6½d. to 6d. per kWh for ordinary consumers.

FESTOON LIGHTING.—The Council's electrical engineer has been asked to submit a scheme for providing festoon lighting on the sea front.

LOAN SANCTIONED.—Sanction has been received to a loan of £11,000 for electrical development.

Congleton.—ELECTRICITY FOR WEST HEATH ESTATE.—The Town Council is to extend cables to give a supply of electricity to the West Heath Estate, where a considerable number of houses are being built.

Corwen (Merionethshire).—DROUGHT AFFECTS SUPPLY.—Owing to the drought, the stream which drives the generating plant for the town shrunk to a mere trickle last week, with the result that electricity was available only after 6 p.m.

Doncaster.—LOAN.—The Electricity Committee recommends that application be made for permission to borrow £30,500 for mains and services.

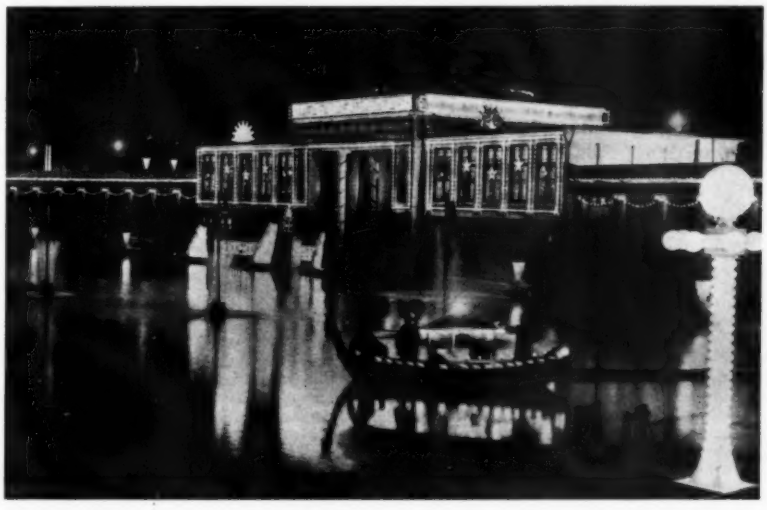
Dunkeld.—PROTESTS AGAINST SUPPLY DELAYS.—Because of the delay in the introduction of electricity promised under the Grampian Electricity Supply Co.'s scheme three years ago, a petition is being lodged by the ratepayers with Mr. Roderick Gillies, District Council representative for Dunkeld, who has been endeavouring to hasten the work. Business premises and houses have been wired for some time, as well as the new joint school for Dunkeld and Birnam. It is understood the delay is mainly due to questions of wayleaves between the electricity company and the Atholl Estates, Ballinluig.

Eastbourne.—EXTENSIONS.—Application is to be made by the Town Council for sanction to borrow £25,000 for future extensions of the electricity undertaking, £728 for additional expenditure in connection with the switch-house, and £717 for supplying electricity to Hankham.

Enfield.—A NEW CABLE.—The North Metropolitan Electric Power Supply Co. proposes to lay a cable (partly underground and partly overground) from Brimsdown to St. Albans, passing through the Enfield district.

ELECTRICITY CHARGES.—The Urban District Council is to support the suggestion to make a joint application to the Electricity Commissioners for a reduction in the prices charged for electricity by the North Metropolitan Electric Power Supply Co.

Great Yarmouth. — REDUCTION IN CHARGES.—The following new scale of charges is being introduced in the borough: Lighting flat rate, 5d. per kWh; cooking and heating, ¾d. in the summer quarters, 1d. in the winter; domestic two-part tariff, a fixed charge of 12½ per cent. of rateable value of the premises supplied, plus a "unit" charge of ¼d. in the summer and ½d. in the winter, with a minimum of 600 kWh per annum; business two-part tariff, £9 per annum for the first 10 kW of lighting installed and £7 for each kW above 10 kW, plus a "unit" charge of 1d.; power, a sliding scale from 1¼d. to 0.85d. Accounts (except special accounts) are subject to a discount of 5 per cent. for prompt payment. A corresponding revised scale of charges applies to areas outside the borough.



The open-air swimming pool at Blackpool will have a Venetian atmosphere when the Autumn Illuminations commence to-morrow. More than five miles of the promenade is to be illuminated

India.—EXTENSION AT CALCUTTA.—The Calcutta Electric Supply Corporation, Ltd., has obtained permission from the Bengal Government to supply electricity to Baidyabati and the surrounding districts, where there are many factories and mills which still use oil as a source of power.

Liverpool.—ALTERATIONS TO SUB-STATION.—Subject to the approval of the Economy (Special) Committee, the Corporation Electric Power and Lighting Committee intends to make structural alterations to the Cunard Building sub-station and to install new equipment, at a total estimated cost of £1,250.

LOAN SANCTIONED.—Sanction has been received to the borrowing by the Corporation of £6,208 for works carried out in connection with the Maghull, Aughton and Lydiate electricity undertaking.

Lochwinnoch (Renfrew).—STREET LIGHTING PETITION.—Over 750 residents in Lochwinnoch have signed a petition in favour of electric lighting for street lamps instead of gas.

Maidstone.—NO SUPPLY FOR LOOSE.—The Minister of Transport has refused consent to the use of overhead lines for supplying electricity to Loose village, and as the cost of laying underground mains is prohibitive no supply can be given.

MAINS EXTENSIONS.—The Town Council has approved mains extensions in Weavering Street (£540); Station Road, Aylesford, to supply twenty-four Council houses (£290); Pratling Street Estate, Aylesford (£500); and Hollingbourne (£110).

Manchester.—NEW MOTORS REQUIRED.—The Cleansing Committee has authorised the purchase of new motors in connection with the change-over from d.c. to a.c. at the Blackley depôt.

Morecambe.—CARNIVAL LIGHTING.—More than 25,000 coloured electric lights are in use in the Morecambe Autumn Carnival Week promenade illuminations. The scheme, which has cost £7,000, embodies ten miles of wire strip and 200 poles. Special features are the brilliant colour illuminations of the promenade gardens and elaborate lighting settings, including rainbow colouring of a water fountain at the West End.

Moretonhampstead.—A SUPPLY FROM TORQUAY.—The Torquay Electricity Department has completed a cable to Moretonhampstead, and a number of people are now taking supplies.

Okehampton.—ELECTRIC STREET LIGHTING.—A public supply of electricity, provided by the West Devon Electricity Co., Ltd., has now been made available. Although the town has had an electricity supply for many years, gas has hitherto been used for public lighting.

Oswestry.—ELECTRICITY CHARGES.—On the recommendation of the North Wales and South Cheshire Local Authority Electricity Undertakers' Association, the Town Council is to appeal to the Electricity Commissioners to determine the amount the North Wales Power Co. is entitled to charge for giving the Council an indirect supply from the grid through the company's transmission lines.

Petworth.—RESULT OF INQUIRY.—As the result of a recent inquiry, the Ministry of Transport has disallowed the application of the Mid Southern Utility Co. for permission to erect overhead lines in Grove Street and Grove Lane, Petworth, and the mains will be placed underground. The Rural District Council, however, has approved a revised proposal for overhead l.p. mains at Wisborough Green.

Portsmouth.—LOAN.—The Electricity Committee is applying for sanction to borrow £100,000 for mains and services.

Sanderstead (Surrey).—NEW SUB-STATION.—The County of London Electric Supply Co., Ltd., is to erect a sub-station at Rectory Park.

Sanquhar (Dumfriesshire).—SUPPLY INAUGURATED.—The County Council's electricity supply for part of the town was switched on at Sanquhar last Friday. Among those present were: Mr. Pickles, county electricity engineer; Mr. Ross, his deputy; and Mr. Helm, local district engineer. Consumers in other parts of the town who have their houses wired have petitioned the Town Council to rescind its decision against overhead lines, but no definite decision has yet been reached.

Sheffield.—REORGANISATION SCHEME.—The City Council has approved further proposals of Mr. E. Morgan, general manager of the Electricity Supply Department, regarding the reorganisation of transport arrangements in connection with the mains department's work, meter collection and distribution, inspectors' duties and the collection of accounts.

South Africa.—KROONSTAD SCHEME PASSED.—The Town Council of Kroonstad, Orange Free State, has decided to proceed with the electricity supply, costing £60,000, involving the installation of entirely new generating plant and a change-over from d.c. to a.c. The scheme has been held up for two years.

THE JOHANNESBURG EXTENSIONS.—The Johannesburg Tramway and Lighting Committee is proceeding with the first part of the electricity extension scheme recently sanctioned by the Provincial Administrator. The Committee has recommended acceptance of the tender of the British General Electric Co., Ltd., amounting to £26,000, for one 10,000-kW generator, and the City Council has completed arrangements for connecting up with the Victoria Falls and Transvaal Power Co., Ltd., for a partial supply of 8,000 kW.

Stowmarket.—ALL-ELECTRIC STREET LIGHTING.—Referring to the note which appeared in our issue of August 25th (p. 264), Mr. B. G. Drummond, general manager and engineer of the East Anglian Electric Supply Co., Ltd., says that the inauguration ceremony mentioned was simply the switching on of the public lighting and not of a general electricity supply. Stowmarket has, in fact, enjoyed a public supply for over thirty-seven years and was one of the first small towns in England to start a supply, thanks to the late Mr. Napier Prentice. About two years ago the town was changed over from local d.c. generation to bulk supply. Stowmarket streets are now electrically lighted throughout, gas being completely superseded, and Mr. Drummond says that the inhabitants are highly delighted with the very much improved lighting. The lighting installation comprises eighty-nine lamps, the contract being for a period of seven years.

Wensley (Yorkshire).—DROUGHT STOPS SUPPLY.—Insufficient water to drive the turbines has put the electrical supply plant out of action at Wensley.

Traction

Australia.—OVERCROWDING ON TRAMS.—To a deputation which complained of overcrowding on the tramcars, Mr. A. Cameron, chairman of the Melbourne & Metropolitan Tramways Board, said that to provide a seat for every passenger at peak periods would require 150 more electric tramcars and 70 more cable cars. The annual cost would be £250,000, which, added to the present deficiency of £100,000, would give a deficit of £350,000 a year. No reserves were available for the purpose, and extra cars could be supplied only by increasing the rates by at least 4½d. in the £ over the whole of the metropolitan tramways area.

Bradford.—PROFIT ON TRAMS.—After involving regular loss for some years, a profit on the Bradford city tramways has been realised in each of the monthly periods from April to July, the net credit balances for the respective periods being £554, £566, £883 and £723, a total of £2,726, as compared with a loss of £8,497 in the corresponding period of last year. Mr. C. R. Tattam, tramway general manager, says that there has also been an improvement in traffic during August, and there is every indication of greater improvement in the future. The improved results are said to be due to better traffic, a reduction of capital and sinking fund charges by £7,500, and £4,500 less expenditure.

Costa Rica.—NEW ELECTRIC LOCOMOTIVES.—Eight 56-ton 820-h.p. electric locomotives have just been purchased by the Pacific Railway of Costa Rica, for working passenger and goods trains over an 80-mile mountain line with gradients of 1 in 40. This railway is the only single-phase electrified system in the two Americas south of San Francisco, and works at a pressure of 15,000 V.

France.—ACCUMULATOR TRACTION.—Following a series of trials between Toulouse and Sainte Foy de Peyrolières, the Compagnie des Chemins de Fer du Sud-Ouest Français has decided to adapt its system to accumulator traction, and an order has consequently been placed for a number of electric locomotives weighing 34 tons each, capable of attaining a speed of 37½ m.p.h. Each engine will be fitted with four motors developing 50 h.p. each at 800 r.p.m., and with power ta 125 V supplied by an 800-Ah 135-cell battery. The Compagnie des Chemins de Fer d'Intérêt Local du Moribihan has also recently adopted battery traction on its local railway system. The locomotives are fitted with compound motors so arranged that on running downhill they can operate as generators for recharging the batteries.

NEW EXPRESS LOCOMOTIVES.—The twenty-five high-speed electric locomotives recently acquired by the Paris-Orleans Railway are to be supplemented by four express locomotives of 4,000 h.p. of an entirely new design intended for use on the mountainous Vierzon-Brive section now being electrified. About one hundred 1,400-h.p. mixed-traffic locomotives, sixty-seven of which are now on order, will also be required shortly.

TROLLEY-BUSES IN ROUEN.—The tramway authorities of Rouen have recently inaugurated a trolley-bus service. Vehicles of two sizes, built by the Vetra Co., of Paris, are being used, one having accommodation for a total of sixty-one passengers and one for forty-one persons.

Glasgow.—LOAN FOR SUBWAY ELECTRIFICATION.—The Transport Committee is to ask for sanction, in the next Provisional Order to be promoted, to borrow up to £150,000 in connection with the electrification of the subway. Originally it was decided to ask for powers to borrow £100,000, but, as the cost of alterations due to electrification is estimated at £117,000, the increased borrowing powers are required.

Italy.—TROLLEY-BUSES FOR VENICE.—A service of electric trolley-buses has recently been inaugurated between Mestre and Venice along the recently completed viaduct between the Italian mainland and the city.

London.—TRAMWAY BREAKDOWN.—A fault at the Mildmay Park sub-station was responsible for a serious delay in the tramway service on the City-Manor House and Shoreditch-Stamford Hill routes on Wednesday evening last week. The stoppage began just before 5 p.m. and lasted over an hour.

THROUGH SERVICE TO UXBRIDGE.—The London Passenger Transport Board is making arrangements for a through service of Piccadilly trains to Uxbridge in about two months' time. This will involve an extension of the Piccadilly service from South Harrow to Uxbridge, and will bring Piccadilly Circus within 50 minutes of Uxbridge. It will also provide a new through route across London from Cockfosters to Uxbridge, a distance of 32 miles.

Middlesbrough.—PROPOSED TRAMWAY ABANDONMENTS.—The question of scrapping the Corporation's tramway system on the Linthorpe-Transporter Bridge route will come up for consideration at the next meeting of the Tramways Committee. It is understood that the point which is arousing the most discussion at the moment is whether the trams should be replaced by trolley-buses or buses.

South Africa.—THE JOHANNESBURG TRANSPORT SCHEME.—The Transvaal Administrator, Mr. J. S. Smit, has refused to receive a deputation from the Johannesburg City Council regarding the Council's application for permission to raise a loan of £232,875 for the city transport scheme. Mr. Smit points out that, as the Council has decided to appoint a committee to investigate Johannesburg's transport problems, the application for permission to raise the loan should be deferred until the committee has reported. This means that the orders for new tramcars will be delayed for some months.

Communications

Australia.—AMPLIFIERS FOR VICTORIA PARLIAMENT.—The House Committee of the Victoria Parliament has been asked to consider the improvement of the acoustic properties of the Legislative Assembly Chamber by the installation of a system of amplifiers operating loud-speakers.

N.S.W. TELEPHONE PROGRESS.—At the end of June there were 183,024 telephone subscribers in New South Wales, as compared with 181,336 at June 30th, 1932.

Droitwich.—HIGH-POWER RADIO STATION.—The completion of the new high-power long-wave National broadcasting station which the B.B.C. is now building at Droitwich to replace the old Daventry station is likely to render the National transmitters at Brookmans Park (London), Watchet (Western), and Moorside Edge (Northern) redundant. The plant will then probably be transferred to new Regional stations in the North-East of England, North of Scotland, and Droitwich to serve the Midlands.

East Indies.—WIRELESS TELEPHONE EXPERIMENTS.—Following successful experiments in wireless telephone communication with Kuala Lumpur (Malay States), efforts are to be made to extend communication by wireless telephone to the whole of Malacca, including Singapore.—*Reuter* (Bandung, Java).

France.—NEW BROADCASTING STATION.—Plans are said to have been completed for the increase of the power of the P.T.T. Paris broadcasting station from 8 to 120 kW. The new transmitter will be erected at Villejuste, twelve miles from Paris, while the studios will remain in Paris. According to the *Daily Telegraph*, the object is to bring the programmes within daytime range of crystal-set users throughout Paris and its suburbs.

Great Britain.—RADIO RELAY SERVICES.—In a Clerkenwell Police Court case this week a wireless relay company alleged that the defendant, who lived in a basement flat, had been secretly tapping its line serving a subscriber who lived in the upper flat, and that he had connected his loud-speaker to the line without subscribing to the service. The company prosecuted under Sec. 10 of the Larceny Act, 1916, under which it is a felony to steal electricity by tapping a wire. Defendant was fined £1 and £1 1s. costs.

The Accrington Joint Electricity & Highways Committee has considered tenders for the right to install relay services, but has deferred the matter pending further inquiries.

Hessle U.D.C. has granted a ten years' relay concession to the Broadcast Relay Service, Ltd.

Enfield U.D.C. has been asked to allow Wired Wireless, Ltd., to establish a relay service in the district. The company stated that it had an arrangement with the Post Office authorities which would obviate the necessity for seeking the consent of the Middlesex County Council to wires crossing county roads. No action is to be taken.

Irish Free State.—RADIO LICENCES.—The number of radio receiving licences issued reached a total of 36,228 on July 31st, 1933.

Llantarnam.—ELECTRICITY CHARGES FOR RADIO.—The Electricity Committee has decided that when consumers use wireless receivers connected to the heating circuits the charge for electricity so used shall be at the lower heating rate instead of at the lighting rate.

London.—BROOKMANS PARK TRANSMITTER IN DANGER.—The B.B.C. transmitters at Brookmans Park were endangered on Saturday afternoon last by a grass fire which reached the masts and within a few yards of the buildings. The London Regional programme was interrupted for half an hour.

TELEVISION TESTS.—Part of the Crystal Palace is to be rented for carrying out experimental television transmission tests, which are not, however, likely to affect the present arrangement between the B.B.C. and Baird Television, Ltd.

Manchukuo.—FEWER WIRELESS LICENCES.—The Dairen broadcasting station was established at the beginning of 1932, and by May of that year there were 11,726 listed owners of wireless sets. This year there are only 8,053, and it is believed that the police regulations against the use of short-wave sets have been construed by the public as meaning that listening is discouraged.

Portugal.—RADIO STATION FIRE.—The beam section of the Marconi Company's wireless station at Alferragide, near Lisbon, is reported to have been destroyed by fire last Sunday.

South Africa.—AUTOMATIC TELEPHONES.—The change-over to automatic telephones in Cape Town is to take place on December 17th. The system will then be in operation from Camps Bay to Rondebosch, inclusive.

South America.—WORLD TELEPHONE SERVICE.—The world telephone network has just been further extended by the inauguration of the service between Argentina, Chile, Uruguay, Nicaragua, Yugoslavia and Palestine. The radio-telephone facilities and most of the telephones in the three South American countries are operated by associated companies of the International Telephone and Telegraph Corporation and constitute a unified network. The radio-telephone stations at Buenos Aires are employed for the inter-continental service, and the connection with Nicaragua is made by way of the American Telephone & Telegraph Co.'s station in New Jersey; with Yugoslavia by way of Berlin and land wire to Belgrade, and with Palestine by way of London.—*Reuter's Trade Service* (New York).

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Adwick-le-Street.—September 25th. Urban District Council. 1,600 prepayment meters. (September 8th.)

Arbroath.—September 19th. Town Council. Electrical work at housing scheme. Burgh engineer (deposit £1 1s.).

Australia.—ADELAIDE.—October 17th. Engineering and Water Supply Department. Four turbo-blowers and three compressors, with motors and starters. (G.Y. 12890.)*

MELBOURNE.—Post and Telegraph Department. September 26th. Bell sets and portable telephones. (A.Y. 11963.)*

November 14th. Submarine telephone cable. (A.Y. 11973.)*

October 30th. State Electricity Commission of Victoria. 6,600-V current-limiting reactors. (A.Y. 11971.)*

Belgium.—ANDERLECHT.—September 25th. Hotel Communal. Meters. Particulars for 3 fr. from Regie de l'Electricité, 4, Rue Van Lint, Anderlecht.

Birkenhead.—September 28th. Mersey Railway Co. Metallic and carbon filament lamps and fittings. Mr. J. Shaw, general manager and secretary, Central Station, Birkenhead.

Brazil.—RIO GRANDE.—September 29th. Viacas do Rio Grande do Sul. 1,000 dry cells for telephones. (A.Y. 11969.)*

Cheadle and Gatley.—September 28th. Electricity Department. Kiosk sub-station, switchgear, and static transformer. (See this issue.)

Cupar.—September 19th. Fife and Kinross District Asylum. Electrical work, cooking appliances, &c., for central kitchen. Mr. A. D. Haxton, architect, Commercial Road, Leven (deposit £1 1s.).

Dumbarton.—October 6th. County Council. Electrically operated swing bridge over the Forth and Clyde Canal at Erskine Ferry Road, Old Kilpatrick. Messrs. Crouch & Hogg, chartered civil engineers, 17, Lynedoch Street, Glasgow (deposit £5 5s.).

Eastbourne. — September 16th. Electricity Department. Meters. (September 8th.)

Egypt.—CAIRO.—October 5th. Ministry of the Interior. 1,000 a.c. meters. (A.Y. 11948.)*

November 14th. Pumps, electric motors, boilers, &c. (G.Y. 12912.)*

October 5th. Main switchboard, four distribution panels, earthing materials, instruments and reactance coils. (A.Y. 11957.)*

October 28th. Three-phase generating set and two batteries of condensers for power-factor improvement. (A.Y. 11953.)*

November 14th. Prisons Administration. Machinery, including electric motors, switchboard and cables, for extension of Delta Barrage Spinning Mills. (F.Y. 1841.)*

ALEXANDRIA.—October 25th. Ports and Lighthouses Administration. Electric cables, switchgear, transformers, electrically driven hauling winches and motors for the port of Alexandria. Chief inspecting engineer, Egyptian Government, 41, Tothill Street, London, S.W.1. (Specifications, &c., 12s., not returnable.)

GIZA.—October 5th. Ministry of Education. Cables, switchboards and other electrical apparatus. (A.Y. 11957.)*

Erith.—September 25th. Electricity Department. 500-kVA transformer. (See this issue.)

Exminster.—September 22nd. Devon Mental Hospital Committee. Electric lamps. Mr. C. Masters, clerk, Devon Mental Hospital.

Folkestone.—September 16th. Town Council. Internal and external wiring of houses, Penfold Road. Mr. E. L. Allman, borough engineer.

Glasgow.—September 18th. Corporation. Electric lighting installation at Quarrybrae Street extension and Cartyne (additional houses). General manager, Electricity Department, 75, Waterloo Street.

Great Western Railway.—September 28th. Telegraph instruments, electrical apparatus, &c. (See this issue.)

Guildford.—September 25th. Corporation. Installation of electric lighting, &c., at Council Offices, Millmead House. Mr. J. W. Wilton, Millmead House, Guildford (deposit £1 1s.).

India.—NEW DELHI.—December 4th. Indian Stores Department. 220/230-V, single-phase, 50-cycle ceiling fans. (A.Y. 11959.)*

December 11th. D.c. ceiling fans. (A.Y. 11965.)*

January 8th. A.c. and d.c. table fans. (A.Y. 11967.)*

October 25th. A.c. and d.c. meters. (A.Y. 11968.)*

Irish Free State.—DUBLIN.—September 20th. Corporation. Two automatically controlled electrically driven axial flow pumps (10,000 gal. per minute each). City engineer, Castle Street.

MONAGHAN.—September 21st. Installation of electric lighting plant at the Monaghan Mental Hospital. Mr. Gallagher, clerk. Mental Hospital.

London.—HOLBORN.—October 3rd. Borough Council. Vehicle-actuated traffic signals in Kingsway and Great Queen Street. Borough engineer and surveyor.

BERMONDSEY.—September 16th. Borough Council. Electric cable, equipment, and accessories. (August 25th.)

New Zealand.—WELLINGTON.—October 26th. Post and Telegraph Department. 12-V switchboard lamps (A.Y. 11955)* and telephone gongs and attachment nuts. (A.Y. 11956.)*

October 31st. Metal-cased condensers. (A.Y. 11954.)*

Salford.—September 22nd. Electricity Department. 6,600/400-V three-phase oil-immersed transformers. (September 1st.)

South Africa.—JOHANNESBURG.—October 9th. South African Railways and Harbours. Copper contact wire and copper cable. (G.Y. 12901.)

October 28th. City Council. Five sets of electrically operated traffic signals. (A.Y. 1191.)*

Swansea.—October 9th. Electricity Department. Coal-handling plant for the new Tir John power station. (September 8th.)

Wick.—September 30th. Electric lighting work for housing scheme. Burgh surveyor (deposit £1 1s.).

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Beaconsfield.—Urban District Council. Accepted. Lighting Malthouse Square by electricity (£224).—J. B. Harris.

Birkenhead.—Electricity Committee. Recommended. Installations under the assisted wiring scheme.—Economic Electric Co., Ltd. (£723); L. W. Bryan (£271); P. Seymour (£86); J. J. Peters (£65).

Bolton.—Tramways Committee. Accepted. Materials for overhead equipment for trolley-bus service.—British Insulated Cables, Ltd.

Cardiff.—Electricity Committee. Accepted. Feeder equipment for Roath power station (£750).—Brookhirst Switchgear Co., Ltd. Miniature control panel (£85).—Metropolitan-Vickers Electrical Co., Ltd.

Chanctonbury.—Rural District Council. Accepted. Installation of electric lighting at the Council offices (£65).—Page & Miles, Ltd. (Brighton).

Connah's Quay.—Electricity Committee. Accepted. Wiring houses on Primrose Street estate.—C. Wilcock.

Darlington.—Town Council. Accepted. Two trolley-buses.—English Electric Co., Ltd.

Dewsbury.—Electricity Committee. Accepted. Electric wiring and supply of lamps for main road lighting at Ravensthorpe (£370).—Ward & Co. (Dewsbury), Ltd. Lamps and fittings for subsidiary streets (71s. 6d. per lamp standard).—Wardle Engineering Co.

Eastbourne.—Electricity Committee. Recommended. One 300-kVA transformer (£204) and eight 200-kVA transformers (£150 each).—British Electric Transformer Co., Ltd.

Lincoln.—Electricity Committee. Accepted. Two transformers (£122 each).—Bruce Peebles & Co., Ltd.

Machynlleth.—Urban District Council. Accepted. Wiring in various buildings.—J. R. Lewis.

Manchester.—Town Hall Extension Special Committee. Accepted. Electric lighting and heating fittings.—A. E. Sudlow and Co.

Housing Committee. Accepted. Electrical installations at the 130 flats and houses to be erected on the Anson Estate.—E. M. Evans & Son, Ltd.

Corporation Waterworks Committee. Accepted. Electrically driven centrifugal pumps, &c., for Blackley booster station.—

One of the Best & Lloyd lighting fittings installed at the Masonic Peace Memorial which was opened recently

Frank Pearn & Co., Ltd. Renewal of the positive sections of the electrical storage battery at Thirlmere.—D.P. Battery Co., Ltd.

Corporation Electricity Committee. Accepted. Requirements of street lighting columns during the period ending February 28th, 1934.—Bromford Tube Co., Ltd.; British Mannesmann Tube Co., Ltd.

Southampton.—Electricity Committee. The order recently placed with Ferranti, Ltd., for electricity meters was valued at £4,580, not £458, as stated in our issue of September 1st.

Swansea.—School Building Committee. Accepted. Electrical installation at the new Gors School.—Messrs. Whittier.

Wednesbury.—Housing Committee. Accepted. Wiring 172 houses at Park Lane and eighteen in Dangerfield Lane.—Goostry and Poole.

Notes

The Edmonton "Empire"

The new "Empire" Cinema which was recently opened in New Road, Edmonton, N., is a splendid building, and the architecture and decoration are of the most modern character. It has seating accommodation for 2,500 people. M. Theodore Komisarjevsky has been responsible for the art decorations, in conjunction with which electric light is skilfully employed. The pictures which appear on page 353 of this issue give a slight idea of the nature of the interior work. The lighting fittings were supplied by Messrs. Best & Lloyd, Ltd.; exterior signs by the Strand Electric Co., Ltd.; sound apparatus by the Western Electric Co., Ltd., and vacuum-cleaning plant by the British Vacuum Cleaner & Engineering Co., Ltd. The electrical engineering work was directed by Mr. W. M. Pope. It is stated that this work involves the use of 19½ miles of wire, 20,000 ft. of steel conduit and 4,227 electric lamps.

"Sieray" Lamps at Margate

The "Sieray" a.c. hot-cathode 400-W lamp displayed at Margate during the Convention of the Association of Public Lighting Engineers (and referred to in our issue of September 8th) has been developed at the Preston works of Siemens Electric Lamps & Supplies, Ltd. These lamps give approxi-

Illumination at the Jubilee Clock Tower, Margate, was provided by "Sieray" lamps during the Public Lighting Engineers' Conference

mately two and a half times the amount of light of a gas-filled tungsten filament lamp of similar voltage. In addition, a range of colour-floodlighting tubes has been developed operating on a similar principle, and which strike up on normal supply voltage without the aid of a high-frequency circuit.

Mining Electrical Engineers

The South Wales branch of the Association of Mining Electrical Engineers is to visit the Portishead power station of the Bristol Corporation on September 21st.

Safety of Mining Telephones

An investigation at the Mines Department Testing Station, Sheffield, of the safety of mining telephones of the magneto ringing type, by Captain C. P. Platt, M.B.E., superintending testing officer, and Dr. J. T. Burdekin, has been published by the Stationery Office (6d. net). The purpose of the investigation was to determine by what means magneto-telephones could be made intrinsically safe, *i.e.*, so as to render any sparks produced on breaking the circuit, either in the instrument itself or at any point on the line wires, incapable of igniting firedamp. Current for speech is so small as to be harmless, and possible danger confined to the current obtainable from the magneto-generator. This danger can be effectively guarded against by shunting the armature winding of the magneto-generator with a non-inductive resistance, without materially reducing ringing efficiency, with any number of instruments connected in parallel, even if as many as three magnetos are being operated simultaneously in phase. As with magnetos in series, the value of the shunting resistance must be reduced progressively to ensure safety, and this method of connection should be discontinued. The results of this investigation constitute the basis on which the Mines Department is able to undertake type tests of magneto-telephones, and to grant certificates of intrinsic safety.

Impregnating Standing Timber

A new process patented for the preservative treatment of timber to be used for telegraph poles or railway sleepers consists in injecting an impregnating medium into the sap stream of the living tree. The usual impregnating media are carried imperfectly, if at all, by the sap, but, according to Max Knopff, writing in *Telegraphen- und Fernsprech-Technik*, arsenious acid, arsenic acid, or their easily soluble salts can readily be conveyed from the base of the trunk to the ends of the branches by this means. Boreholes in the trunk are filled with the treating material in the form of a solid, paste, or concentrated solution. The openings being closed by plugs of wood, plaster, or clay, the arsenious compounds are disseminated by the sap flow, and the tree is soon killed and thoroughly impregnated; it can be left to season before being felled. The cost of treatment is further reduced by the fact that the arsenious compounds are capable of carrying with them other and cheaper impregnating materials which cannot be carried by the sap alone. Satisfactory results are said to have been obtained with a mixture of seventy-five parts arsenic acid with twenty-five parts sodium fluoride, and with a mixture of sodium arsenite and benzoate in equal parts.

Fatality

A nurse was killed at the Wimbledon Hospital last week as the result of a 50,000 V shock received during the taking of an X-ray photograph. At the inquest the house surgeon stated that while a patient was being X-rayed the nurse put her hand forward to press the patient's blanket. There was a crack and a big spark, and "yellow flame." The nurse recoiled, but said she was all right. A few seconds later she fell to the floor and, although artificial respiration was tried, she died of heart failure. The jury returned a verdict of accidental death, no blame being attached to anybody.

Women's Engineering Society

The eleventh annual conference of the Women's Engineering Society opens to-day at Crosby Hall, Cheyne Walk, Chelsea, S.W.3, and will continue until Monday next. To-morrow morning a series of papers will be read and discussed; in the afternoon there will be an official visit to the Shipping, Engineering & Machinery Exhibition at Olympia; and in the evening a dinner will be held at the Forum Club, 6, Grosvenor Place, Hyde Park Corner,

A Paris Conference

An international conference is to be held in Paris from October 16th to 23rd next in connection with the celebrations of the twenty-fifth anniversary of the formation of the Société Française de Chime-Physique. Among the many papers to be read by French, German, Belgian, Russian, Swiss, Italian and British scientists are one by Prof. E. K. Rideal, of Cambridge, on "Phase Boundary Potentials"; one by Mr. A. H. Wilson, Cambridge, on "The Electrical Properties of Semi-conductors and Insulation." Prof. Joffe, of Leningrad, is also contributing a paper on the last-mentioned subject. Herr F. Bloch, of Leipzig, will also read a paper on "Electrons in Metals and their Static Properties." Full particulars of the conference can be obtained from the Sécrétaire Général of the Société, M. C. Marie, of 9 Rue de Bagneux, Paris VI.

Large Smelting Furnaces in France

Although the majority of the furnaces used for the production of calcium carbide, cyanamide, and iron alloys in France are of the single-phase type, furnaces employing three-phase power are gradually coming into use, two large ones of this variety having lately been constructed in the Pyrénées. The first, which has a capacity of 11,000 kW, has been installed at the works at Marignac of the Société des Produits Azotés to replace four 3,500-kW furnaces used for the production of carbide. The furnace, which is of the Soderberg three continuous electrode type, has been developed in conjunction with the Société des Electrodes de la Savoie. The second furnace, which has been installed at the Lannemezan works of the Société des Produits Azotés, has a capacity of 12,000 kW, and is also used for carbide production. The electrodes in this case are, however, not continuous, but are similar to those used in Germany by the Stickstoff Co.

Educational

Classes in electrical engineering will open on September 25th at the School of Engineering and Navigation, Poplar; the South-East London Technical Institute, Lewisham; Hackney Technical Institute; and Paddington Technical Institute. Full particulars can be obtained from the Principals or from the Education Officer (T.6), County Hall, S.E.1. (See our classified advertisements.)

The new session of day and evening classes in electrical engineering commences at the Battersea Polytechnic, London, on September 25th. Particulars may be obtained on application to the Principal. (See our classified advertisements.)

Classes held in connection with the synthetic resin and moulding trade will commence at the Borough Polytechnic on September 25th. The enrolment nights are September 18th, 20th and 22nd, and full particulars can be obtained from the principal, Mr. J. W. Bispham.

Makers' Names Wanted

Device for withdrawing pulleys from shafting.

Welded cylindrical dynamo yokes (approximately 8 in. in diameter).

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Lt.-Commander Haydn T. Harrison was, we regret to learn, unable to attend the recent Conference of the Association of Public Lighting Engineers owing to illness, and, on the president's suggestion, a telegram expressing good wishes and a speedy return to health was sent from the meeting.

Mr. J. Johnson Smith has joined Messrs. Johnson & Phillips, Ltd., London Office, Columbia House, Aldwych, W.C., as a senior sales engineer. Mr. Smith has been with Messrs. Crompton Parkinson, Ltd., in the same capacity for a number of years, prior to which he was with the York Corporation Electricity Department and the Sunderland Corporation Electricity Department.

Mr. A. S. Herbert, M.I.E.E., deputy export manager of the English Electric Co., Ltd., and for many years their general manager in Australia, has resigned his position from September 30th in order to join the firm of Herbert & Sons, Ltd., manufacturers of food preparing machinery, 6 and 7, West Smithfield, E.C.1, with a seat on the board.

Mr. Francis H. R. Law, A.I.E.E., of the British Electric Transformer Co., Ltd., has been appointed by British National Electrics, Ltd., as their sales engineer in the South Yorkshire area. His private address is, 5, The Avenue, Horsforth, Leeds.

Mr. A. P. M. Fleming, director and manager of the Research Department of the Metropolitan-Vickers Electrical Co., Ltd., has been reappointed local honorary secretary for Great Britain of the American Institute of Electrical Engineers for the two-year term from August 1st last. Particulars and forms of application for the various grades of the A.I.E.E. can be obtained from him.

The J. B. Electrical Co., Ltd., ask us to state that **Mr. E. Langrish** has relinquished his connection with the company.

Mr. J. Gardner, the author of the article on "Low-voltage Distribution," which appears on p. 344, is the patentee of the system described, in conjunction with Ericsson Telephones, Ltd. He received his early training in the shipbuilding industry with Sir William Beardmore & Co., Ltd., and Sir W. G. Armstrong Whitworth & Co., Ltd. During the War he superintended the installation of Evershed & Vignoles signalling systems for guns and searchlights on ships of the Grand Fleet. In 1922 he entered the telephone industry as a power equipment engineer with the Automatic Electric Co., Ltd., and during the past five years he has been with Ericsson Telephones, Ltd. He is at present developing a further scheme on his own initiative.

Mr. J. Gardner

Mr. J. Stuart Jones, who retires from the controllership of the Central Telegraph Office at the end of the current month, entered the Post Office service in 1892 as a clerk in the Savings Bank, but was transferred three years later to the Secretary's office, the Post Office headquarters office. For about twenty years he was principally concerned with the Post Office telephone service and became in 1907 one of the two traffic managers of that service, the other being the late Mr. John Lee, C.B.E. In 1910-11 he was a member of a Post Office commission which visited the United States to study the telephone practice of that country in anticipation of the transfer of the National Telephone Co.'s system to the Post Office which took place in 1912. At the end of the war he took over the duties of Inspector of the Telegraph Service, and in 1924 became Deputy Chief Inspector of Telegraph and Telephone Traffic. In 1926 he was appointed by the Postmaster-General to be Deputy Controller of the Central Telegraph Office and was promoted to the Controllership in the following year. Mr. Stuart Jones was a member of the commission headed by Mr. Leon Simon (now Director of Telegraphs and Telephones) which visited the United States in 1928 to study the practice of the telegraph companies in that country. He was made a C.B.E. last year.

Mr. J. M. Kennedy, M.Inst.C.E., M.I.E.E., who, as announced in our issue of July 28th, p. 139, has accepted the invitation to become president of the Association of Supervising Electrical Engineers, will deliver his presidential address at the opening meeting of the session, which will be held in the Council Hall at Chaucer House, Malet Place, W.C. (the new headquarters of the Library Association) on October 17th. Mr. G. Scott Ram, the retiring president, will preside.

Mr. G. E. Smith, who was recently married to Miss G. W. Barrow, was presented with a cheque by the Windsor and Slough Electrical Co., of whose staff he is a member.

Mr. A. N. Rye, M.I.E.E., formerly managing director of Edmundson's Electricity Corporation, Ltd., has retired. Mr. Rye was apprenticed to Messrs. Ronald Scott & Co., and also served two years' apprenticeship with Messrs. Samuelson & Co., Ltd., mechanical engineers. He received his technical education at the City and Guilds of London Institute. He subsequently held appointments in the electricity undertakings at Leeds, Ayr and West Ham. In 1901 he joined the Edmundson group of companies, and was resident manager at Hawick until 1910. He was then appointed resident manager at Guernsey and remained there, with the exception of two years' war service in the Artillery (1914-16) until 1919, when he was appointed assistant general manager to Edmundson's. In 1921 he became general manager, and in 1928 managing director.

[*Lafayette*

Mr. J. T. H. Legge

Mr. J. T. H. Legge, who succeeds Mr. Rye as managing director of Messrs. Edmundson's Electricity Corporation, Ltd., is well known to our readers as the managing director of the Shropshire, Worcestershire and Staffordshire Electric Power Co., and he has been prominently identified with the development of this company and its subsidiaries, including the South Wales Electric Power Co. He is also chairman of the Central England Advisory Committee of the Central Electricity Board. His appointment is another step towards obtaining fullest co-ordination in the technical and economic development of the group of supply authorities now controlled by the Corporation.

Mr. R. S. Montgomerie, late chief assistant sales engineer of the Electro-Mechanical Brake Co., has now joined Messrs. J. G. Smithson & Co., Ltd., electrical control gear manufacturers of Moor Street, Birmingham, as sales director.

Mr. J. A. Leese, of the staff of the Wolverhampton Corporation Electricity Department, who was recently married to Miss J. H. Besant, received an oak clock from his colleagues.

Mr. S. F. Ferguson, for many years federal secretary of the Australian Association of British Manufacturers at its head office in Melbourne, has been appointed director. Mr. Ferguson is well known in Australia for his work on behalf of British industry particularly in connection with tariff matters.

Mr. E. Saunders, who has retired from the Liverpool Tramways Department after nearly thirty-five years' service, has been presented by his colleagues with a gold watch.

Mr. H. A. Maton, of the staff of Messrs. W. T. Henley's Telegraph Works Co., Ltd., who was recently married at Gravesend to Miss E. A. Reynolds, has been presented by the engineering staff with a canteen of cutlery and a biscuit barrel.

Mr. G. T. Archibald, who is to succeed Mr. Stuart Jones as Controller of the Central Telegraph Office, entered the Workington Post Office as an unpaid learner in 1893. In the following year he went to Kendal as a paid learner, where he remained until 1897, when he was appointed sorting clerk and telegraphist at Manchester. In 1917 he became assistant

[*Elliott & Fry*

Mr. J. Stuart Jones, C.B.E.

[*Lafayette*

Mr. G. T. Archibald

inspector of telegraph and telephone traffic, Class II, and, in 1920, Class I. He was appointed Inspector in 1926. His next position was as Assistant Controller at the Central Telegraph Office, which he obtained in 1929, and in the following year he became deputy controller, which position he is now vacating. Mr. Archibald was a member of the British Telegraph Commission which went to the United States in 1928 to study American telegraph practice, and he has been a member of several important departmental committees in connection with staffing and traffic. He takes up his new duties of Controller on October 1st.

Mr. L. H. J. Phillips, A.M.I.E.E., was married on September 2nd, at Manchester, to Miss Dorothy Smith.

Obituary

Mr. W. C. Kimpster.—The death is announced of Mr. William Corbitt Kimpster, engineer and manager of the Bishop Stortford, Harlow, and Epping Gas & Electricity Co. He was thirty-seven years of age, and was appointed six years ago.

Mr. A. E. Watson.—We regret to record the death of Mr. Alfred Ernest Watson, joint manager of the Enfield Cable Works, Ltd., which occurred on September 12th. Mr. Watson was formerly manager of Messrs. Veritys, Ltd., and was fifty-two years of age. The funeral ceremony takes place at St. Pancras Cemetery, East Finchley, to-day, Friday, at 12 o'clock.

The late Mr. A. E. Watson

Mr. W. H. Perrow.—Mr. W. H. Perrow, M.I.E.E., a prominent South African electrical engineer, has died at Johannesburg at the age of seventy-four. He went to South Africa in 1896, having previously carried on business as the County Electrical Works at Truro, Cornwall, where he specialised in electro-medical applications. On arrival in South Africa he was in charge of electrical construction on various gold mines. He relinquished this position on account of ill health and started his own business, exhibiting and lecturing on X-ray and other apparatus. He returned to the mining fields as electrical engineer, but retired in 1916 and went to Cape Town, where he started the business of Will H. Perrow & Son, which he relinquished several years ago. Mr. Perrow was one of the founders of the South African Institute of Electrical Engineers, of which he was president in 1917.

Mr. T. R. D. Pargetter.—The death is announced at the age of thirty-seven years of Mr. Thomas R. D. Pargetter, of Evesham, who had for fourteen years been on the electrical staff of the Shropshire, Worcestershire and Staffordshire Electric Power Co. For the past seven years he had been at Evesham, and was formerly stationed at Dudley.

Sir Gilbert Vyle.—We regret to record the death of Sir Gilbert Christopher Vyle, managing director of W. & T. Avery, Ltd., of Birmingham. Sir Gilbert, who was nearly sixty-three years of age, had been ill for some time. Born into a family already making electrical history—his father, Samuel Vyle, was a pioneer in electricity supply in England—he was himself trained as an electrical engineer and entered the service of the Post Office. Subsequently he went overseas under the Colonial Office, returning, after some years, to England, where he took up electrical manufacturing and subsequently consulting engineering work. Just before the war he joined Messrs. Avery, and he was thenceforth a leading figure in Birmingham, and, indeed, British, industrial life and enterprise. His interest in the Castle Bromwich branch of the British Industries Fair is well known to the electrical and other engineering trades. He was a president of the Birmingham Chamber of Commerce, the Association of Chambers of Commerce, and the British Engineers' Association, and as an authority on home and overseas trade questions he was much in demand. He was on a committee which reported some years ago on water-power resources, was a member of the Mond-Turner labour conference, sat on Government inquiries regarding the British Industries Fair, advised the Government Delegation to Ottawa on trade matters, and was an earnest advocate of inter-Imperial trade. He was knighted in 1928, and in the last New Year's Honours list was made a K.B.E.

[*Int. Rotogravure*

The late Sir Gilbert Vyle

Mr. H. Lee.—The death occurred after a brief illness on September 5th, of Mr. Harold Lee, of Bradmore, Wolverhampton, who for many years represented Wolverhampton Corporation on District No. 5 of the West Midland Area Joint Board of Employers and Members of Staffs of Electricity Supply Undertakings.

Wills.—Mr. G. T. C. Edwards, for forty years resident engineer of the Bristol Tramways & Carriage Co., Ltd., left £10,398 (net personalty £10,281).

Mr. S. H. March, head of the Agency Department of Messrs. Alfred Herbert, Ltd., left £24,944 (net personalty £22,063).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Radio Components, Ltd.—Private company. Registered August 25th. Capital, £600 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless apparatus, components and parts, &c. The subscribers are: T. Kolb and G. Kolb, both of 9, Hart Street, Bloomsbury, W.C. Secretary. G. Kolb.

Electrical Transport and Equipment Co., Ltd.—Private company. Registered in Dublin on September 4th. Capital, £1,000 in £1 shares. Objects: To act as salesmen and distributing agents in the Irish Free State and elsewhere for electrical vehicles, &c. The directors are: T. Fitzgerald, "Rose Arch," Old Blackrock Road, Cork; C. F. Lane, Passage West, Co. Cork. Solicitors: Barry C. Galvin & Son, 38, South Mall, Cork

Bradford Electrical Services, Ltd.—Private company. Registered September 7th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electricians, mechanical, automobile and general engineers and contractors, manufacturers and workers of and dealers in electricity, wireless telegraphy, &c. The directors are: J. S. Ramsbottom, Sunny Bank, Riddlesden, Keighley; and H. Green, Beech Mount, Cononley, near Keighley. Registered office: Victoria Works, Thornton Road, Bradford.

Robins (Radio), Ltd.—Private company. Registered September 4th. Capital, £1,000 in £1 shares. Objects: To acquire the business of wireless and general electrical and mechanical engineers, hitherto carried on by Leslie S. Garley and Wm. Duggan at 18a, Oxford Street, Swansea. The permanent directors are: L. S. Garley, 18, Malvern Terrace, Swansea; and W. Duggan, Fair View, Cockett Road, Swansea. Solicitors: Wm. King Davies, 62, Station Road, Port Talbot.

Chiswell Wire Co., Ltd.—Public company. Registered August 28th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wires, cables, conductors, turbines, boilers, dynamos, motors and mechanical and electrical machinery, plant and fittings, layers of cables, steel manufacturers and refiners, electrical engineers, &c. Subscribers: G. K. Ireland, 103b, Argyle Road, West Ealing, W.13; A. E. Spencer, 15, Oak Hill Crescent, Woodford Green; and five others. Solicitors: Herbert Oppenheimer, Nathan & Vandyk, 1, Finsbury Square, E.C.

Arbs, Ltd.—Private company. Registered September 4th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers, repairers and chargers of and dealers in radio and other batteries and wireless sets, electricians, &c. The subscribers are: F. H. Cope, "Fieldend," Hucclecote, Glos; and A. R. Jones, 27, St. Michael's Square, Gloucester. Solicitors: H. H. Vowles, 65, Northgate Street, Gloucester.

Goodmans (Clerkenwell), Ltd.—Private company. Registered September 5th. Capital, £4,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of, dealers in and agents for the sale of all machinery and apparatus for use in connection with wireless telegraphy, &c. The permanent directors are: E. S. Newland and Marjorie E. Newland, both of 6, Clyda Mansions, Gondar Gardens, Hampstead, N.W.6. Registered office: Fairfax House, Fulwood Place, High Holborn, W.C.1.

C. Miller (Wimbledon), Ltd.—Private company. Registered September 6th. Capital, £4,000 in 1,000 6 per cent. participating preference and 3,000 ordinary shares of £1 each. Objects: To acquire the business of sellers and makers of electrical appliances, wireless sets, gramophones, &c., carried on by C. Miller at 97, High Street, Wimbledon, S.W.1. The directors are: C. Miller, 97, High Street, S.W.19; Miss Mary Miller, 25, Lingfield Road, S.W.1; and W. Normann, c/o Williams Deacons Bank, Ltd., 127, Cheapside, E.C.2. Secretary: Charles Miller. Solicitors: Gregsons, 34, Surrey Street, Strand, W.C.2.

Sutol Manufacturing Co., Ltd.—Private company. Registered September 5th. Capital, £600 in 300 10 per cent. non-cumulative participating preference and 300 ordinary shares of £1 each. Objects: To acquire the provisional patent number 13103 from Cuthbert C. Smith, to manufacture and deal in

machinery plant and appliances, and to carry on the business of electricians, mechanical engineers and manufacturers, &c. The directors are: C. C. Smith, 124, Gloucester Road, Kingston-on-Thames; and A. B. Cheesman, 9, Compton Road, Wimbledon, S.W.19. Secretary: C. C. Smith. Registered office; 18, Cowleaze Road, Kingston-on-Thames.

W. G. Rainbow, Ltd.—Private company. Registered September 8th. Capital, £300 in £1 shares. Objects: To carry on the business of electrical contractors, &c. The subscribers (each with one share) are: W. G. Rainbow and Mrs. A. M. Rainbow, both of 16, Mansfield Road, N.W.3. Secretary: O. B. Crisp. Registered office: 16, Mansfield Road, N.W.3.

Electric Light Utility Co., Ltd.—Private company. Registered September 8th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electrical fittings of every description. The directors are: Albert Wilson, 42, Cranwich Road, Stamford Hill, N.16, and Nathan Freidlander, 46, Cambridge Court, Edgware Road, W.2 (directors of General Illuminating Co., Ltd.). Registered office: Empire House, St. Martin's le Grand, E.C.1.

Wembley Distributors, Ltd.—Private company. Registered September 7th. Capital, £500 in £1 shares. Objects: To carry on the business of electricians, mechanical and gas engineers, workers of and dealers in electricity, &c. The permanent directors are: H. G. W. Haslett, 93, Elmstead Avenue, Wembley Park; J. E. Haslett, 90, Grenoble Gardens, Palmers Green, N.13; and D. F. Fisher, 109, Carlton Avenue East, Wembley Park. Solicitors: J. H. Lambert & Co., 116a, High Road, Wembley.

Tubelamps, Ltd.—Public company. Registered September 6th. Capital, £100 in £1 shares. Objects: To carry on the business of electricians, electrical and mechanical engineers, manufacturers of and dealers in gasfilled electric discharge tubes and electric incandescent filament lamps, &c. The subscribers are: A. E. Ashwell, 53, Somerset Avenue, Hook, Surbiton; T. J. R. Hill, 23, Verdayne Avenue, Shirley, Surrey; A. S. Carde, "Holmgarth," Datchworth, Knebworth, Herts; and four clerks. Registered without articles of association. Secretary: A. Ezekman. Registered office: 4, London Wall Avenue, E.C.2.

Marcus, Overton Radio, Ltd.—Private company. Registered September 4th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in wireless, electrical and scientific apparatus, &c. The directors are: D. P. Marcus, 31, Wilmot Way, Banstead, Surrey; and G. P. Overton, 50, Gleneagle Road, Streatham, S.W.16. Secretary: C. H. Spencer. Registered office: 62, Borough High Street, S.E.1.

Tom Butcher, Ltd.—Private company. Registered August 28th. Capital, £200 in £1 shares. Objects: To acquire the business of a radio and electrical engineer, carried on by T. Butcher at 41, King Street, Ramsgate. The directors are: A. T. Butcher, 41, King Street, Ramsgate; and A. W. Dray, 67, Plains of Waterloo, Ramsgate. Registered office: 41, King Street, Ramsgate.

Radiette, Ltd.—Private company. Registered August 21st. Capital, £100 in £1 shares (50 "A" and 50 "B"). Objects: To carry on the business of manufacturers of and dealers in wireless and electrical apparatus, instruments, appliances, fittings and accessories, &c. The directors are: L. H. Tate, 158, Bishopsgate, E.C.2; and Miriam Raivid, 69, Queen's Road, Finsbury Park, N.4. Registered office: 158, Bishopsgate, E.C.2.

Returns of Electrical Companies

Geo. Bray & Co., Ltd.—Capital, £160,000 in £1 shares (£80,000 preference and £80,000 ordinary). Return dated April 25th, 1933. 55,000 preference and 55,000 ordinary shares taken up. £7 paid. £109,993 considered as paid. Mortgages and charges, £40,000.

Anglo-American Telegraph Co., Ltd.—Capital, £7,000,000 in £243,030 ordinary stock, £3,378,460 preferred ordinary stock, and £3,378,460 deferred ordinary stock. Return dated May 23rd, 1933. All stock taken up. £600,000 paid. £6,400,000 considered as paid. Mortgages and charges, nil.

West London and Provincial Electric and General Trust, Ltd.—Capital, £390,000 in £198,000 ordinary stock and £192,000 5 per cent. preference stock. Return dated May 18th, 1933. All stock taken up. £264,000 paid. £126,000 considered as paid. Mortgages and charges, nil.

English Electric Co., Ltd.—Capital, £5,000,000 in 1,500,000 preference and 3,500,000 ordinary shares of £1. Return dated April 25th, 1933. 1,135,844 preference and 1,443,468 ordinary shares taken up. £902,614 10s. paid on 902,613 ordinary and ½ preference shares. £1,676,697 10s. considered as paid on the remainder. Mortgages and charges, £1,078,836.

Nelco, Ltd.—Mortgage on the Auto Electric Works, Station Road, Shalford, Surrey, dated August 24th, 1932, to secure all moneys due or to become due from the company to the Midland Bank, Ltd.

Newquay Electric Light & Power Co., Ltd.—Capital, £50,000 in £1 shares. Return dated May 18th, 1933. All shares taken up. £39,820 paid, £10,180 considered as paid. Mortgages and charges, nil.

Concordia Electric Safety Lamp Co., Ltd.—Capital, £60,000 in £1 shares. Return dated March 13th, 1933. 40,000 shares taken up. £40,000 paid. Mortgages and charges: £5,000.

Erskine, Heap & Co., Ltd.—Capital, £50,000 in 10s. shares. Return dated April 13th, 1933. 46,489 shares taken up. £4,413 paid, £18,831 10s. considered as paid. Mortgages and charges, nil.

Melton Mowbray Electric Light Co., Ltd.—Capital, £60,000 in £5 shares. Return dated May 11th, 1933. 9,600 shares taken up. £48,000 paid. Mortgages and charges: £19,100.

China and Japan Telephone and Electric Co., Ltd.—Capital, £75,000 in £1 shares. Return dated May 9th, 1933. 55,000 shares taken up. £40,239 paid, £14,761 considered as paid. Mortgages and charges, nil.

Tungstalite, Ltd.—Capital, £8,000 in 7,000 ordinary and 1,000 preference shares of £1. Return dated April 13th, 1933. All shares taken up. £7,700 paid on 6,700 ordinary and 1,000 preference shares, £300 considered as paid on 300 ordinary shares. Mortgages and charges, nil.

Bergmann Electric Co., Ltd.—Capital, £5,000 in £1 shares. Return dated May 24th, 1933. 701 shares taken up. £701 paid. Mortgages and charges, nil.

Kitson's Insulations, Ltd.—Capital, £7,500 in 5,000 preference of £1 and 5,000 ordinary shares of 10s. Return dated November 24th, 1932 (filed May 15th, 1933). 5,000 ordinary shares taken up. £1 paid. £2,499 considered as paid. Mortgages and charges, £5,000.

Camborne Electricity Supply Co., Ltd.—Capital, £20,000 in £1 shares. Return dated May 18th, 1933. All shares taken up. £20,000 paid. Mortgages and charges, nil.

Chas. Macintosh & Co. (South America), Ltd.—Capital, £20,000 in £1 shares. Return dated May 24th, 1933. 14,000 shares taken up. £14,000 paid. Mortgages and charges, nil.

Spence (Contracting), Ltd.—Debenture dated August 26th, 1933, to secure £100, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. M. G. H. Green, Hellings Farm, Wiveliscombe, Somerset.

City Notes

Ferranti, Ltd., report a net profit for the year ended June 30th last after making provision for general establishment charges, bad debts, repairs and renewals, &c., of £57,869, as compared with £54,904 in the preceding year, to which is added £41,545 brought in, making £99,414. After deducting the preference dividend it is proposed to maintain the ordinary dividend at 6 per cent., less tax, leaving £46,414 to be carried forward. The report states that considerable extensions to plant have been made during the year. Mr. D. Z. de Ferranti has been appointed a director of the company. Meeting: September 15th.

Companies to be Struck off the Register.—The names of the following companies will be struck off the Register at the expiration of three months unless cause is shown to the contrary:—Auto Radio, Ltd.; the Bold Electric Clock Co., Ltd.; Centrolian Radio, Ltd.; Corolectric, Ltd.; Dronfield & District Electric Service, Ltd.; Fenchurch Radio, Ltd.; Hardyson Radio, Ltd.; Matchless Radio Manufacturing Co., Ltd.; Rolyat Electrical Co., Ltd.; Stewards Electrical Co., Ltd.; the Triumph Radio Co., Ltd.

The Bognor Gas & Electricity Co. is offering additional ordinary consolidated stock "A" for sale by tender. The amount offered will not exceed, including premiums, £14,820, ranking for standard dividend of 5 per cent. per annum, subject to the sliding scale, equally with the existing similar stock, which has for the last five and a half years received a dividend of 8 per cent. per annum. The minimum price of the issue is £160 per £100, yielding at that price £5 per cent. per annum.

Edmundson's Electricity Corporation, Ltd., reports that during August the electrical energy generated and purchased totalled 34,925,000 kWh, as compared with 28,036,000 kWh in the corresponding month of 1932, an increase of 25 per cent. The total for the first eight months of the current year was 295,822,000 kWh, as against 247,361,000 kWh in the corresponding period of 1932, an increase of 20 per cent.

Winnipeg Electric Co.—A *Reuter* message from Winnipeg states that Mr. E. Anderson, president, has announced that the company will not pay interest due on October 2nd on either its 5 per cent. refunding mortgage stock or on its 6 per cent. refunding mortgage bonds.

The Vera Cruz Electric Light Power & Traction Co., Ltd., reports a net loss for 1932 of £27,621, as against £8,415 in 1931. Compensation to employés and other charges absorbed £5,117, and after deducting £4,318 brought in and £2,447 from contingency reserve, a debit balance of £25,973 is carried forward.

The Sun Electrical Co., Ltd., has declared a dividend of 5 per cent. on the ordinary shares for the year. Last year the total dividend was the same, but it was paid in two equal instalments.

The Oxford Electric Co., Ltd., does not propose to pay an interim dividend on the ordinary shares. No interim dividend was paid last year, but the final distribution was 7 per cent.

Stocks and Shares

TUESDAY EVENING.

IT may be that the protracted summer weather has had the effect of sapping energy from Stock Exchange Markets, but, for whatever reason, the fact remains that business has fallen off to a noticeable extent as compared with the activity that prevailed a month ago. The completion of the grid system, widely advertised as it was, appears to have given rise to a certain uneasiness in the minds of shareholders in electrical equipment and manufacturing companies lest the conclusion of the work should mean a falling-off in orders to the companies concerned. This apprehension has had no quotable effect upon the prices in our list, but it makes itself felt in the market through there being a little less facility in selling shares to-day than there has been of late. The shares in the leading companies stand at levels at which the return on the money is comparatively modest, but with the extension of the consumption of electricity the work which manufacturing companies will be called upon to undertake is not likely to suffer to any extent, even though, for the time being, there may not be so many big contracts as there were during the establishment of the grid.

Rises in " Money " Stocks

The near approach of what is expected to be a scheme for funding the floating indebtedness of the Government is a factor that continues to make its influence felt upon gilt-edged stocks in particular markets. Central Electricity 5 per cents. of 1950-1970 and the 4½ per cents. of 1951-1973 are both up by 2 points. London Passenger Transport " A " at 116 has put on a point; the " B " stock at 119½ is the fraction better. It seems a little ironical that at a time when investment is looking for an early decline in the prices of gilt-edged stocks, by reason of the idea that trade and industry will require money at present invested in such securities, the prices of the latter should be steadily advancing. The improvement is due to the pronounced difficulty that prevails of finding employment for surplus cash. Expectation has been so frequently wrong, of recent years, in its diagnosis of the financial position that even people who profess to look for a general shrinkage in gilt-edged securities are themselves buyers of the very stocks that, according to this argument, must fall in price over the next few years. That trade is better, a number of indications prove. The decrease of unemployment, the weekly increases in Home Railway traffics, and the Board of Trade returns are definite pointers. These all play upon what may be called money stocks, amongst which we have, for several years past, included the shares of the leading London Electricity Supply Companies, on the assumption that these undertakings are, in their way, unique through the security and stability that they offer to the proprietor of their shares.

London Passenger " C " stock is up 2 points at 83 upon speculative investment support.

Electricity Supply

Following upon the number of rises that occurred last week in the shares of the electricity supply companies, there has been something of a halt, though in the London group County ordinary at 55s. 9d. are ⅛ higher, and Edmundson's preference at 33s. have gained a shilling. It may be worth while to re-emphasise the attention drawn lately to the manner in which preference shares of the electricity supply companies are being readily taken at prices which seem tolerably high. The supply is as scanty in most cases as the margin of security is liberal. North Metropolitan ordinary are better at 59s. 3d., West Gloucestershire ordinary has eased off to 62½, Electric Supply Corporation more than maintain the remarkable rise which they have secured during the last few weeks. Northampton Electrics at 53s. 9d., and Yorkshire Electrics at 46s. 3d., are both ⅛ higher. On the other hand, Electric Distribution of Yorkshire ordinary at 48s. 9d. have lost 9d. of the substantial gain which they secured a week ago. Southern Areas at 26s. 6d. and Atlas ordinary at 9s. 3d. are both slightly lower than they were at the end of last week.

Cables and Wireless

Public attention declines to take any particular degree of interest in the stocks of the Cables & Wireless combine, the result being that the " A " ordinary stock has receded another point to 29, the preference remaining unchanged at 82½, the " B " ordinary at 14. Globe Telegraph & Trust shares are ex dividend; the deductions from ordinary and preference shares have been recovered in both cases. Marconi Marines eased off to 32s. 6d. Great Northerns receded 10s. to 30½.

U.S.A. and Inflation

The American utility stocks and shares, after a spasm of weakness, assumed a brighter complexion upon private advices from New York to the effect that the proposed inflationary policy of President Roosevelt is likely to be put into practical effect before very long. As every observer knows, the position in the United States is that President Roosevelt has formulated a policy which does not wholly commend itself to some of the banking interests. There is an obvious conflict of opinion, and one indirect effect is the outbreak of a strike-movement which threatens to become serious. The President appears to be bent upon putting his plan into operation, and, if he succeeds, prices of commodities, base metals, &c., are bound to advance. Those who consider him strong enough to win through are buying utility stocks and shares upon the anticipation of the inflationary movement becoming effective. Its reaction will be felt, of course, on this side of the Atlantic, and the situation as it develops from day to day in the United States is being watched with earnest interest.

American Telephone & Telegraph stock dipped to 139 and recovered to 144½. International Telephone & Telegraphs are 19. Brazilian Tractions show a small loss on the week.

Manufacturing and Equipment

One of the arguments used to demonstrate the probability of plenty of work being available for manufacturing and equipment companies, in spite of the fact that the grid is now complete, points out that the next step will be the carrying of electricity supply into every part of the United Kingdom. The equipment companies expect to benefit from the intensive campaign that is in prospect. Prices are steady, a fall of 9d. in Associated Electrical Industries to 21s. 3d. being the only quotable fall in the list. Brush ordinary has moved up a couple of points to 37.

In spite of the favourable nature of the Board of Trade returns, iron and steel shares are dull. Babcocks have gone back to 36s. 9d. The Rubber market, on the other hand, is distinctly better, on the hopes of American inflation and a general rise in prices.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1931.	1932.	Price, Sept. 12.	Rise or Fall.	Yield. p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	77/6xd.	+1/–	3 17 5
Brompton Ordinary	1	8½	7	33/–	—	4 4 10
Charing Cross Ordinary	1	8½	7	33/–	—	4 4 10
Chelsea	1	8½	7	32/6xd.	+6d.	4 6 2
City of London	1	10	10	33/9	—	4 3 0
Clyde Valley	1	7	7	37/6	—	3 14 8
County of London	1	10½	10½	55/9	+⅛	3 15 1
Edmundson's 7% Pref.	1	7	7	33/–	+1/–	4 4 10
Elec. Dis. Yorkshire	1	9	9	48/9	–9d.	3 13 9
Elec. Supply Corporation	1	11	11	77/6	+⅛	2 16 8
Kensington Ordinary	1	8	7	32/6	—	4 6 2
Lancs Light and Power	1	7	7	35/9	—	3 18 5
London Electric	1	9	7	33/–	+6d.	4 4 10
Metropolitan	1	10	10	51/3	—	3 18 2
Midland Counties	1	7	7	36/3	+6d.	3 17 5
Mid. Elec. Power	1	8	8	40/–	—	4 0 0
North Eastern Electric Ordinary	1	6	6	32/6	—	3 13 10
Do. 7% Pref.	1	7	7	33/–	—	4 4 10
Northampton	1	10	10	53/3	+⅛	3 15 0
Notting Hill 6% Pref.	10	6	6	13½	—	4 12 4
North Met. Elec. 6% Pref.	1	6	6	29/6	—	4 1 4
St. James' and Pall Mall	1	8	7	33/–	—	4 4 10
Scottish Power	1	8	8	40/–	—	4 0 0
South London	1	8½	7	33/–	—	4 4 10
Westminster Ordinary	1	8½	7	33/–	—	4 4 10
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/3	—	7 1 2
Yorkshire Elec.	1	8	8	46/3	+⅛	3 9 3
PUBLIC BOARDS.						
Central Electricity, 1950–70 ... Stock	5	5	111	+2		4 10 1
Do. 1951–73 ... „	4½	4½	109	+2		4 2 7
Do. 1963–93 ... „	—	3½	92	—		3 16 1
London & Home Counties, 1955–75 „	4½	4½	107	—		4 4 1
London Passenger Transport, A ... „	—	4½	116	+1		3 17 7
Do. do. B ... „	—	5	119½	+½		4 3 8
Do. do. C ... „	—	—	83	+2		—
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel. ... $100	9	9	144½	+2		6 4 4
Anglo-Am. Tel. Pref. ... Stock	6	6	111½	—		5 7 7
Do. Def. ... „	1½	1½	28	—		5 5 3
Cables & Wireless 5½% Pref. ... „	2½	2½	82½	—		3 6 10
Do. A 7½% Ord. ... „	Nil	Nil	29	–1		—
Do. B Ord. ... „	Nil	Nil	14	—		—
Globe Tel. and T. Ord. ... 10	Nil	2½	11½xd.	+1/–		2 3 6
Do. do. Pref. ... 10	6	6	12½xd.	+½		4 17 0
Great Northern Tel. ... 10	20	20	30½	–½		6 11 2
Marconi-Marine ... 1	10	7½	32/6	–⅛		4 12 4
Oriental Telephone Ord. ... 1	12	12	2½	—		*4 3 6
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref. ... 5	Nil	Nil	4/6	—		—
Do. do. 2nd Pref. ... 5	Nil	Nil	3/3	—		—
Do. do. 5% Deb. ... Stock	Nil	Nil	10½	—		—
British Electric Traction Df. Ord. „	5	5	485	—		—
Do. do. Pref. Ord. „	8	8	142½	—	5	12 3
Brazil Traction 100	—	—	14½	–½		—
Brit. Columbia Elec. Rly. Pce. ... Stock	5	5	102	+1½	4	18 0
Mexico Trams, 5% Bonds ... —	5	5	27½	—	18	3 8
Mexican Light Common ... 100	Nil	Nil	11½	–1		—
Do. 7% Pref. ... 100	7	7	15	—		—
Do. 1st Bonds ... —	5	5	50	—	10	0 0
Victoria Falls Ord. ... 1	15	20	98/9	—	4	1 6
Yorkshire (West Riding) ... 1	Nil	Nil	15/6	+3/6		—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord. ... 1	4	4	21/3	–9d.	3	15 3
Do. Pref. ... 1	8	8	30/9	—	5	4 2
Babcock & Wilcox ... 1	14	9	36/9	–9d.	4	18 0
British Aluminium Ord. ... 1	5	5	31/3	—	3	4 0
British Insulated Ord. ... 1	15	15	71/3	—	4	2 4
Brush Ord. ... ... Stock	Nil	Nil	37	+2		—
Callender's 1	15	15	3½	—	4	16 0
Do. 6½% Pref. ... 1	6½	6½	28/9	—	4	10 5
Crompton Parkinson Ord. ... 5/–	22½	—	18/3	—	6	5 7
Do. 8% Pref. ... 1	8	8	28/9	—	5	11 4
Edison-Swan 1st Pref. ... 1	7½	7½	24/6	—	6	2 5
Do. 5% Deb. ... Stock	5	5	102½	—	4	17 7
Electric Construction ... 1	Nil	Nil	8/9	—		—
Enfield Cable Ord. ... 1	25	25	91/3xd.	—	5	9 8
English Electric ... 1	Nil	Nil	10/–	—		—
Do. do. Pref. ... 1	Nil	Nil	15/–	—		—
Ever Ready 5/–	35	35	28/3	—	6	4 0
Ferranti Pref. ... 1	7	7	25/9	—	5	8 9
G.E.C. Pref. ... 1	6½	6½	29/–	—	4	9 8
Do. Ord. ... 1	8	8	45/–	—	3	11 2
Henley's 1	30	30	6½	—	4	14 4
Do. 4½% Pref. ... 5	4½	4½	5½	—	4	5 9
India-Rubber ... 1	Nil	Nil	3/9	—		—
Johnson & Phillips ... 1	5	5	22/–	—	4	11 0
Siemens Ord. ... 1	7½	6½	24/6	—	5	6 0
Telegraph Construction ... £1	Nil	Nil	23/9	—		—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1931

18672. "Automatic resistance welding system." E. G. Budd Manufacturing Co. November 12th, 1930. (397157.)
31351. "Indicator means for use in connection with electric cut-outs." F. T. Jenkins. November 12th, 1931. (397105.)
33915. "Electric discharge tubes." British Thomson-Houston Co., Ltd. December 6th, 1930. (397162.)

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423. "Electric discharge devices." British Thomson-Houston Co., Ltd. January 6th, 1931. (397107.)
4291. "Electric remote control and indication." Standard Telephones & Cables, Ltd., E. M. S. McWhirter, J. G. Flint, & C. G. White. February 13th, 1932. (397118.)
4653. "Method of conditioning magnetic materials." Electrical Research Products, Inc. March 2nd, 1931. (397134.)
4721. "Telegraphic installations." Siemens & Halske Akt.-Ges. February 17th, 1931. (Addition to 306406.) (397145.)
4741. "Control of motors for electrically propelled vehicles." A. J. Hall and Associated Electrical Industries, Ltd. February 17th, 1932. (397171.)
4840. "Electric switchgear." A. Reyrolle & Co., Ltd., and A. Allan. February 18th, 1932. (397149.)
4844. "Portable electric hand lamps." J. F. W. Johnson. February 18th, 1932. (397150.)
4925. "Electro-magnetic relays." Standard Telephones & Cables, Ltd., and R. St. G. Terry. February 19th, 1932. (397174.)
4926. "Coupling networks and circuits particularly applicable to thermionic amplifiers." Standard Telephones & Cables, Ltd. February 21st, 1931. (397175.)
4995. "Automatic and semi-automatic telephone plants." Telefonaktiebolaget L. M. Ericsson. February 25th, 1931. (397177.)
5113. "Electrically driven hand tools." Duss & Bender Spezialfabrik für Elektrowerkzeuge Ges. and W. Bender. February 20th, 1932. (397185.)
5563. "Mechanical vibration damping devices." Western Electric Co., Ltd. (Bell Telephone Laboratories Inc.). February 24th, 1932. (Cognate application 8410/32. (397200.)
5565. "Smoothing arrangements for rectified electric current." Electrical Research Products Inc. and R. J. P. Jeffcock. February 24th, 1932. (397201.)
6003. "Battery terminal." D. Rennie (T. A. Rennie). February 29th, 1932. (397207.)
6098. "Electric incandescent lampholders." R. Loew. August 28th, 1931. (397208.)
6604. "Loud speaker installations." H. Guggenheim. March 5th, 1931. (397214.)
7059. "Thermionic valve circuits for short wave generation." J. E. Pollak (J. Pintsch Akt.-Ges.). March 9th, 1932. (397216.)
7582. "Apparatus for measuring or indicating phase relation of a.c. circuits." J. C. Kubale and General Railway Signal Co., Ltd. March 14th, 1932. (397221.)
7943. "Arrangement and actuation of the magnetos and other accessories of internal combustion engines." W. J. McIntyre. February 25th, 1933. (397225.)
8155. "Apparatus for the measurement and control of power factor." General Electric Co., Ltd., and D. C. Espley. March 18th, 1932. (397229.)
8177. "Telephone sets." Barringtons (Designers), Ltd., J. H. Bennett, and J. H. Agar. March 19th, 1932. (Cognate application 30800/32.) (397230.)
8945. "Electric fusible cut-outs." W. H. Turner and W. H. Isherwood. March 29th, 1932. (397234.)
10867. "Electric protective arrangement." J. Gray (Allgemeine Electricitäts Ges.). April 15th, 1932. (397245.)
11222. "Centralised traffic controlling installations for railways." General Railway Signal Co. April 30th, 1931. (397247.)
12114. "Loading coil containers." General Electric Co., Ltd., H. C. Turner, and G. R. Polgreen. April 27th, 1932. (Cognate application 15968/32.) (397251.)
13132. "Amplifying thermionic tubes or valves." M. A. E. Pressler. May 6th, 1931. (397254.)
13688. "Electric water heaters." A. Wright. May 12th, 1932. (397259.)
13996. "Electric cable." W. T. Henley's Telegraph Works Co., Ltd., and J. H. Savage. May 18th, 1932. (397262.)
14253. "Insulating compound particularly for use in connection with electric cables." Derby Cables, Ltd., and R. Johnston. May 19th, 1932. (397263.)
18547. "Production of alternative modulated signal tone or like currents." W. Jones and F. H. Mole. June 30th, 1932. (397279.)
20097. "Electric discharge devices." International General Electric Co., Inc. July 15th, 1931. (397291.)
21990. "Highly ohmic resistance." Radioakt. Ges., D.S. Loewe. August 25th, 1931. (Addition to 21867/32.) (397296.)
22104. "Electrical prepayment meters." A. J. Howard. August 6th, 1932. (397299.)
22343. "Electrolysers for the manufacture of chlorine and alkaline hydrates." C. Pouyaud. August 11th, 1931. (397300.)
22663. "Apparatus for electrometric determination of hydrogen ion concentration." F. Lux. August 12th, 1932. (397303.)
23354. "Thermionic tubes." Rogers Radio Tubes, Ltd. February 16th, 1932. (397126.)
23355. "Sockets for thermionic tubes." Rogers Radio Tubes, Ltd. March 11th, 1932. (397305.)
25528. "Electric incandescent lamps." R. Bosch Akt.-Ges. November 26th, 1931. (397311.)
25671. "Electric transformers." Westinghouse Electric & Manufacturing Co. October 6th, 1931. (397312.)
28480. "Radio interference preventive devices." Electrolux, Ltd. October 12th, 1931. (397320.)
29467. "Mechanism for controlling the supply of current to electrically operated suction cleaners." Air-Way Electric Appliance Corporation. April 27th, 1932. (397324.)
30558. "Dielectric materials." British Thomson-Houston Co., Ltd. November 2nd, 1931. (397333.)
30778. "Liquid-break electric switches." International General Electric Co., Inc. November 3rd, 1931. (397335.)
31153. "Electrically driven roller." Siemens Schuckertwerke Akt.-Ges. November 4th, 1931. (397338.)
33674. "Thermionic valves and cathode structures therefor." Telefunken Ges. für Drahtlose Telegraphie. November 26th, 1931. (397350.)
34967. "Electromechanical acoustical direction finder." P. Heinrich. December 12th, 1931. (397353.)
35416. "Assemblage of the operative parts with the frame of electricity measuring apparatus." Landis & Gyr Akt.-Ges. December 24th, 1931. (397355.)

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361. "Construction of polyphase meters." Landis & Gyr Akt.-Ges. January 14th, 1932. (397366.)
1934. "Illuminated signs." General Electric Co., Ltd. January 21st, 1932. (397376.)
2865. "Sparking plug for internal combustion engines, and method for producing same." C. Niepenberg and W. Niepenberg. January 30th, 1933. (397381.)
5983. "Alternating-current electric meters acting on the Ferraris principle." M. Wiesengrund. February 25th, 1932. (397392.)
8282. "Moulded insulating materials." British Thomson-Houston Co., Ltd. March 18th, 1932. (397405.)
10815. "Three-way switches for portable or light railways." A. Faure and A. Faure. April 11th, 1933. (397429.)
12918. "Means for producing electric peak voltages." International General Electric Co., Inc. May 3rd, 1932. (397438.)
16579. "Protection of cathodes of thermionic valves." British Thomson-Houston Co., Ltd. January 10th, 1931. (Divided application on 794/32.) (397154.)

Dunston 50-cycle Power Station

THE twelve main-boiler and steam reheater units at the Dunston 50-cycle station of the North-Eastern Electric Supply Co., Ltd., have an aggregate maximum evaporation capacity of 1,686,000 lb. per hr. The amount of flue gas in cu. ft. per min. to be dealt with by the induced draught fans is: four stoker-fired boilers, 326,000 at 11.5 in w.g. pressure; two p.f. boilers, 142,800 at 11.75 in.; four stoker-fired reheater units, 310,400 at 15 in.; p.f. reheater units, 141,200 at 12.6 in.

Two "Sirocco" single-inlet fans are installed per unit; these are driven by squirrel-cage motors through Vulcan-Sinclair hydraulic couplings, which permit of fine speed control. Similar fans are installed on the roof of the boiler house for providing forced draught, the air passed in cu. ft. per min. being: stoker fired boilers, 212,000 at 5.3 w.g. pressure; p.f. boilers, 90,000 at 11 in.; stoker fired reheater units, 203,200 at 5.3 in.; p.f. reheater units, 86,800 at 11.9. in.

The flue dust collectors consist of seventy-two "Davidson" centrifugal collectors, arranged three in parallel on the inlet side of each of the twenty-four i.d. fans. The gases are thus cleaned before passing through the fans, and a cause of erosion of the latter is removed. The arrangement of the collectors in parallel enables maximum efficiency of flue-dust extraction to be obtained at all boiler loadings. With the exception of the Ironbridge station of the West Midlands Joint Electricity Authority, where the flue dust collectors are also of Messrs. Davidson's manufacture, Dunston is the only station in the world at which the parallel method of installation has been adopted.

Messrs. Davidson & Co. also provided and installed the "Aeroto" engine-room ventilating fans and ancillary air and heat insulated gas ducts. A description of the first section

Grit extraction plant at Dunston

of the Dunston 50-cycle station appeared in the ELECTRICAL REVIEW of February 10th last. The ultimate capacity will be 300,000 kW, of which the first 150,000 kW is now running.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnsley.—Houses (24), New Road, Carlton; Mrs. Metcalfe.
Bedfordshire.—Elementary school, Harrold, for County E.C.
Bedlington.—Houses (50), Cambois; J. W. Pooley, U.D.C. surveyor.
Bedworth (WARWICKSHIRE).—Houses (140); Nunts Park Estate Co.
Bexhill-on-Sea.—Entertainments hall, &c.; S. J. Taylor, town clerk.
Bexley.—Shops, Nags Head Lane, Welling, for the Royal Arsenal Co-operative Society; architect's department, Commonwealth Buildings, Woolwich, S.E.
Birkenhead.—Houses (60), Manor Hill Estate; Hamilton Estates, Ltd.
Birmingham.—Rebuilding, 60 and 61, Broad Street (£4,000), for the A.I. Tyre Co.; W. J. Whittalls & Son, builders, Lancaster Street.
Blackpool.—Houses (24), Devonshire Avenue; S. Brooks, Ltd. Houses (34), Riversleigh Avenue, and 66 houses, Red Bank Road; R. Fielding & Son. Houses (38), Rochford Avenue; R. & H. Fletcher, Ltd.
Bolton.—Houses (22), Florence Avenue; Haddock & Bowling. Houses (330), Top Brow Estate; borough engineer. Alterations, Derby Street and Knowsley Street, for the Britannic Assurance Co., Ltd.; Q. Mangnall Bluhm, architect, 20, High Street, Chorley.
Bournemouth.—Catholic church, Ensbury Park; J. F. Ellen, builder.
Bradford.—Estate development, Southfield Road; Northdale Estates, Ltd.
Cambridge.—Houses (68), Green Road Housing Scheme; C. H. Kemp, town clerk, Guildhall.
Cannock.—Additions, Belt Road schools, Hednesford; S. Harrison, architect, The Green, Cannock.
Chesterfield.—Extensions, including assembly hall, Derby Road schools, and handicraft centre, Whittington Moor; chief education officer.
Chippenham.—Houses (22), Wood Lane; borough engineer.
Congleton (CHESHIRE).—Houses (150), with electrical work, West Heath Building Estate; H. E. Rohll.
Coulsdon.—Houses (460), Old Coulsdon Estate, for Old Coulsdon Estates, Ltd.; Firmus Construction, Ltd. Houses (34), Nutfield Road; C. F. Smith & Co. Extensions, St. Peter's School, The Chase; G. Jensen.
Coventry.—Church of the Sacred Heart, Harefield Road, Stoke (£8,000); Matts & Son, builders, Vecqueray Street.
Dagenham (ESSEX).—Houses (36), Whalebone Estate; A. Hillson. Houses (30), Mayfair Road; A. J. Anstead. Ten shops, Whalebone Lane; Callow & Greg.
Derby.—Shops and offices, Queen Street; C. H. Aslin, borough architect, Gower Street.
Doncaster.—Houses (200), between the Sun Inn and Scawthorpe; Thomson & Dixon (Doncaster), Ltd., builders, Greenfield Lane.
Earl Shilton.—Additions and extensions to premises of Edward Pinchess & Co., Ltd., Highfield Street; J. E. Harris and Co., Ltd., builders, Wood Street.
Eastbourne.—Alterations, Terminus Garage, Terminus Place; A. Ford, architect.
East Sussex.—Girls' secondary school, Hove; E. A. Verger, county architect, Lewes.
East Tilbury (ESSEX).—Houses (20), and factory buildings; Bata Shoe Co.
Eccles (LANCS).—Houses (104); Unit Construction Co., Ltd., contractors. Houses (56), Wilfred Road; Ogden & Partington.
Edgbaston (BIRMINGHAM).—Reconstruction of Summer Hill Methodist Church, Monument Road (£5,000); J. R. Deacon, builders, Lombard Street, Lichfield.
Edinburgh.—Houses (34), Cramond Bridge, for Edinburgh Housing Association; A. H. Mottram, architect, 59, Frederick Street. Office and shops, for the Commercial Bank of Scotland, 14, George Street; manager. Primary school, Granton Mains (£40,000); E. J. MacRae, city architect.
Elland.—Houses (50), Heathfield Estate; Paul Rhodes, Ltd., builders, Cardigan Lane, Leeds.
Enfield.—Houses, Hoe Lane and Carterhatch Lane; Reynolds Development Co.
Farnham.—Alterations to Town Hall buildings, for Farnham Market Co.; H. Faulkner.
Fife.—Extension of the Fife Joint Asylum, Cupar (£100,000); Medical Superintendent.
Glasgow.—Houses and shops, Clarkston; John Lawrence (Glasgow), Ltd.
Grangemouth.—Extensions, Scottish Dyes Factory (£40,000); manager.
Hebburn-on-Tyne.—Hotel, Victoria Road (£3,600); T. Clements & Son, builders, Selbourne Gardens, Newcastle-on-Tyne.
Hertfordshire.—Extensions, Osterhills Nurses' Home, for C.C.; Saxon, Snell & Phillips, architects, 9, Bentinck Street, London, W.
Highworth (WILTS).—Houses (85); R.D.C. surveyor.
Hipperholme.—Houses (40), North Edge Estate; Walsh and Maddock, architects, 10, Harrison Road, Halifax.
Hounslow.—Baptist church, Staines Road; H. Hemmings, contractor, Thornton Heath.
Hull.—Cinema, for City & Suburban Cinemas, Ltd. (£10,000); R. G. Tarran, builders, Ryde Avenue.
Irish Free State.—(DUNDALK, CO. LOUTH).—Houses (46); J. F. Doris, town surveyor. (DUN LAOGHAIRE, CO. DUBLIN).—Houses (40); P. J. Hernon, borough manager and town clerk. (CO. KILKENNY).—Hospital (£100,000), with electrical work; J. V. Downes, architect.
Kenilworth.—Houses (24), Arthur Street; Mr. Barber.
Kettering.—Houses (124), Pipers' Hill Estate; U.D.C. surveyor, 2, Gold Street.
Kirkcudbright.—Houses (28); burgh surveyor.
Little Thurrock (ESSEX).—Houses (24), Highfield Gardens; C. Stark.
Llandudno.—Bathing pool (underwater lighting); West Shore Bathing Pool Co.
London.—(BLACKHEATH).—Re-erection of radio works, Tranquil Passage, Tranquil Vale; Shalless & Evans. (DEPTFORD).—Rebuilding, 93-5, High Street; F. T. Dear.
Loughton.—Houses (38), Station Estate; Estate Co.
Manchester.—Municipal school, Sale Road, Wythenshawe; Surveyor's Department, Education Offices, Deansgate.
Mansfield.—Houses (20), Ravensdale Estate (£3,580); borough engineer. Houses (66), Woodland Drive; F. Fowler. Factory, Portland Mills, Victoria Street; T. W. Cash.
Minehead.—Shops and garage, North Street and The Avenue; Perry & Co.
Musselburgh (MIDLOTHIAN).—Houses (48), Beach Lane and New Street; J. Logan, burgh surveyor.
Nantwich (CHESHIRE).—Houses (20), Hillfield Place, for W. Chetwood.
Newcastle-on-Tyne.—Houses (122), Cambrian Estate; R. E. Roberts, housing architect, 18, Cloth Market. Offices, Grey Street, for Lamb & Edge; J. R. Rutherford & Sons, builders, Jesmond.
Newport (SALOP).—Houses (100), Donnington Wood; R.D.C. surveyor.
Oakham.—Cinema, William Dalby Street, for K. J. Norfolk, 32, East Park Parade, Northampton.
Oxford.—Alterations, 9-13, George Street; Perring, Ltd.
Penkull (STAFFS).—Estate development, Oxford Street, for A. F. Powell; Beckett & Bloore, architects.
Retford.—Houses (115); borough surveyor.
Romford.—Laundry extensions, Main Road and Oaklands Avenue, for E. J. Webster.
Ryhope.—Pithead baths (£23,000); Henderson Bros., builders, Tyne Dock, South Shields.
Sanderstead.—Houses, Church Way; C. E. Hanscombe, architect. Development of Briton Hill Estate; Morgan Baines and Clark. Estate development, Addington Road; R. Costain, Ltd.
Seaton Delaval.—Houses (48); U.D.C. surveyor.
Sedgley (WORCS).—Houses (100); T. R. Knight, U.D.C. clerk.
Selsdon.—Development of Park Farm Estate; Industrial Builders, Ltd.
Sheerness.—Houses (167); U.D.C. surveyor.
Sheffield.—Houses (26), Rivelin Valley Road; J. Samuel. Flats (36) and houses (7), Moorfields Estate; Corporation Estates Department. Factory, Petre Street; Champion & Co. Shops (8) and houses, Handsworth Drive; Miss I. M. Hellewell. Elementary school, Wybourn Estate; Canon Dolan, rector of St. Marie's Church.
Shildon.—R.C. church; R. Burke, architect, 12, Grey Street, Newcastle-on-Tyne.
Southampton.—Schools, Shirley Warren; director of education. Houses (68), Sholing, and flats; borough surveyor.
Southend-on-Sea.—Tinfoil factory, Kenway, for W. G. Frith & Co., Ltd.; A. D. Jackson & Son, builders, 7, Bournemouth Park Road.
South Molton (DEVON).—Houses; borough surveyor.
South Shields.—Bank, Sunderland Road, for Martins Bank, Ltd.; T. A. Page & Sons, architects, 67, King Street.
Spondon (DERBY).—Church, Lodge Lane, for the Methodist trustees; secretary.
Stockton-on-Tees.—Houses, Riverside and Cedar Street; G. P. Stainsby, architect. Re-erection of sawmills, North Shore, for W. Broadbent & Sons (£15,000).
Swinton & Pendlebury (LANCS).—Houses (220); U.D.C. surveyor.
Tewkesbury.—Cinema, High Street, for H. E. Weight, Penarth; L. W. Barnard & Partners, architects, Cheltenham.
Walsall.—Factory additions for John Birch & Sons, Upper Brook Street. Offices, Algernon Street; Deacon & Boardman, builders, Algernon Street. Additions to premises of Ideal Leather Case Co., 21, Sandwell Street (£3,000); T. Steventon & Sons, builders, Raleigh Street.
Walthamstow.—Houses (124), Verulam Gardens; Partridge & Deniel.
Warlingham.—Development of Hamsey Green Estate; Thorn & Son.
Warwick.—Houses (150), prison site; Pearson Construction Co.
Watton (NORFOLK).—Rebuilding printing works; Harvey & Sons.
Wednesbury.—Houses (172), Park Estate; borough engineer and trade contractors. Alterations to schools, King's Hill, for E.C.
West Bromwich.—Sewage disposal works (including pumping station), Ray Hall (£60,000); Tarmac, Ltd., contractors, Ettingshall, Wolverhampton.
West Dean.—Houses (26); A. S. Johnson, R.D.C. surveyor, Coleford.
West Riding.—School, Airedale; T. Throup & Sons, builders, Horsforth, Leeds.
West Sussex.—County offices, Chichester (£80,000); C. G. Stillman, county architect. School, Lancing, for E.C.; E. T. Davis, secretary, Chichester.
Winchmore Hill.—Houses (410), Home Farm Estate, for Messrs. Laing; Seymour Couchman & Sons.
Wisbech.—Houses (48); Mollekin Bros., builders, Maltby.
Wishaw (LANARKSHIRE).—Garage, for the Central Scottish Motor Traction Co. (£7,000); manager.
Witham (ESSEX).—Public offices; U.D.C. surveyor.
Worcestershire.—School, Pedmore Road, Stourbridge, for C.C.; A. V. Rowe, architect, 38, Foregate Street.
York.—Houses (78), Church Park Estate; H. Williamson. Houses (£463,000); city engineer. Shops and offices, Piccadilly; W. Dove & Sons, Ltd.